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THE NATURAL HISTORY OF SELBORNE.

PART II.

THE

NATURAL HISTORY OF SELBORNE,

BY THE LATE

REV. GILBERT WHITE, A.M.

FELLOW OF ORIEL COLLEGE, OXFORD.

WITH MISCELLANEOUS OBSERVATIONS AND EXPLANATORY NOTES.

PART II.

LONDON:

BELL AND DALDY, YORK STREET,

COVENT GARDEN.

1868.

Museum
Gift
7-17-39

LETTER LVI.

TO THE HONOURABLE DAINES BARRINGTON.

I RECEIVED your last favour just as I was setting out for this place; and am pleased to find that my monograph met with your approbation. My remarks are the result of many years observation; and are, I trust, true in the whole: though I do not pretend to say that they are perfectly void of mistake, or that a more nice observer might not make many additions, since subjects of this kind are inexhaustible.

If you think my letter worthy the notice of your respectable society, you are at liberty to lay it before them; and they will consider it, I hope, as it was intended, as an humble attempt to promote a more minute inquiry into natural history; into the life and conversation of animals. Perhaps hereafter I may be induced to take the house-swallow under consideration; and from that proceed to the rest of the British *hirundines*.

Though I have now travelled the Sussex-downs upwards of thirty years, I still investigate that chain of majestic mountains with fresh admiration year by year; and think I see new beauties every time I tra-

verse it. This range, which runs from Chichester eastward as far as East-Bourn, is about sixty miles in length, and is called the South Downs, properly speaking, only round Lewes. As you pass along, it commands a noble view of the wild, or weald, on one hand, and the broad downs and sea on the other. Mr. Ray used to visit a family at Danny, just at the foot of these hills; he was so ravished with the prospect from Plumpton-plain near Lewes, that he mentions those landscapes in his "Wisdom of God in the Works of the Creation" with the utmost satisfaction, and thinks them equal to anything he had seen in the finest parts of Europe.

For my own part, I think there is something peculiarly sweet and pleasing in the shapely figured aspect of chalk-hills in preference to those of stone, which are rugged, broken, abrupt, and shapeless.*

Perhaps I may be singular in my opinion, and not so happy as to convey to you the same idea; but I never contemplate these mountains without thinking I perceive somewhat analogous to growth in their gentle swellings and smooth fungus-like protuberances, their fluted sides, and regular hollows and slopes, that carry at once the air of vegetative dilatation and expansion. Or was there ever a time when these immense masses of calcarious matter were thrown into fermentation by some adventitious moisture;†

* Lovers of the picturesque would probably dissent from Mr. White's views on this subject; nevertheless there is something very graceful in the long coast-like lines of hills with their rounded heads heaped summit behind summit, at the foot of which undulating and richly wooded plains or verdant meadows stretch away into distant space. While village spires, cottages, mansions, and woodlands fill up the picture.—Ed.

† Chalk is lime and carbonic acid in the proportion of 44

were raised and leavened into such shapes by some plastic power; and so made to swell and heave their broad backs into the sky so much above the less animated clay of the wild below?

By what I can guess from the admeasurements of the hills that have been taken round my house, I should suppose that these hills surmount the wild at an average of about the rate of five hundred feet.

One thing is very remarkable as to the sheep; from the westward until you get to the river Adur all the flocks have horns, and smooth white faces, and white legs; and a hornless sheep is rarely to be seen: but as soon as you pass that river eastward, and mount Beeding-hill, all the flocks at once become hornless, or, as they call them, poll-sheep; and have moreover black faces with a white tuft of wool on their foreheads, and speckled and spotted legs: so that you would think that the flocks of Laban were pasturing on one side of the stream, and the variegated breed of his son-in-law Jacob were cantoned along on the other. And this diversity

parts of the latter to 56 parts of the former, and is insoluble in water. But how would our author's wonder have increased, if he had known, as we may now be said to know, that this girdle of chalk mountains which intersects so large a portion of Kent, Sussex, Surrey, and Hampshire, is the bed of an ancient sea from which the waters have retired: still greater would have been his wonder if it had been demonstrated to him, as it may be said to have been to us, that the chalk owes its origin to organic life; every atom of these chalky masses have circulated in the veins of animals or in the organs of plants which lived and died in the bosom of a cretaceous sea; there are assembled, microscopic shells so minute that ten millions are required, to form a cubic inch of chalk; these mingled with polypora and other testaceous creatures now crumbling into dust, have, in decomposing, formed mountain masses of chalk beds of organic life, which by the wisdom of God now enrich the crust of the earth, and form the sources of organized life.—Ed.

holds good respectively on each side from the valley of Brambler and Beeding to the eastward, and westward all the whole length of the downs.* If you talk with the shepherds on this subject, they tell you that the case has been so from time immemorial; and smile at your simplicity if you ask them whether the situation of these two different breeds might not be reversed? however, an intelligent friend of mine near Chichester is determined to try the experiment, and has this autumn, at the hazard of being laughed at, introduced a pareel of black-faced hornless rams among his horned western ewes. The black-faced poll-sheep have the shortest legs and the finest wool.

[The sheep on the downs in the winter of 1769 were very ragged, and their coats much torn; the shepherds say they tear their fleeces with their own mouths and horns, and they are always in that way in mild wet winters, being teased and tickled with a kind of lice.

After ewes and lambs are shorn, there is great confusion and bleating, neither the dams nor the young being able to distinguish one another as before. This embarrassment seems not so much to arise from the loss of the fleece, which may occasion an alteration in their appearance, as from the defect

* Whatever may have been the fact at the date of this letter, the Southdown, or horuless race of sheep, are now found not only existing west of the Adur, but in all the upland parts of England; and it was calculated a few years ago that 864,000 ranged on the South-downs alone, having almost superseded the Dorsets or horned sheep, chiefly in consequence of the improvement both in the wool and as mutton. The great improver of the breed, Mr. Ellman, commenced his operations in 1780, and in eight years the market price of sheep had increased rather more than one-third. They are smaller in the bone, equally heavy with the Dorsets, apter to fatten, and heavier when fat.—Ed.

of that *notus odor*, discriminating each individual personally; which also is confounded by the strong scent of the pitch and tar wherewith they are newly marked; for the brute creation recognize each other more from the smell than the sight; and in matters of identity and diversity appeal much more to their noses than their eyes. After sheep have been washed there is the same confusion, from the reason given above.]—OBSERVATIONS ON NATURE.

As I had hardly ever before travelled these downs at so late a season of the year, I was determined to keep as sharp a look-out as possible so near the southern coast, with respect to the summer short-winged birds of passage. We make great inquiries concerning the withdrawing of the swallow kind, without examining enough into the causes why this tribe is never to be seen in winter; for, *entre nous*, the disappearing of the latter is more marvellous than that of the former, and much more unaccountable. The *hirundines*, if they please, are certainly capable of migration; and yet no doubt are often found in a torpid state:* but redstarts, nightingales, white-throats, black-caps, which are very ill provided for long flights, have never been once found, as I ever heard of, in a torpid state, and yet can never be supposed in such troops from year to year to dodge and elude the eyes of the curious and inquisitive, which from day to day discern the other small birds that are known to abide our winters. But, notwithstanding all my care, I saw nothing like a summer bird of passage: and, what is more strange, not one wheat-ear, though they abound so in the autumn

* The author seems to have argued himself into this belief, for they never have been so found.—ED.

as to be a considerable perquisite to the shepherds that take them; and though many are to be seen to my knowledge all the winter through in many parts of the south of England. The most intelligent shepherds tell me that some few of these birds appear on the downs in March, and then withdraw to breed probably in warrens and stone-quarries: now and then a nest is ploughed up in a fallow on the downs under a furrow, but it is thought a rarity. At the time of wheat-harvest they begin to be taken in great numbers; are sent for sale in vast quantities to Brighton and Tunbridge; and appear at the tables of all the gentry that entertain with any degree of elegance.* About Michaelmas they retire and are seen no more till March. Though these birds are, when in season, in great plenty on the south-downs round Lewes, yet at East-Bourn, which is the eastern extremity of those downs, they abound much more. One thing is very remarkable—that though in the height of the season so many hundreds of dozens are taken, yet they never are seen to flock; and it is a rare thing to see more than three or four at a time: so that there must be a perpetual flitting and constant progressive succession. It does not appear that any wheat-ears are taken to the westward of Houghton-bridge, which stands on the river Arun.†

I did not fail to look particularly after my new migration of ring-ousels; and to take notice whether they continued on the downs to this season of the

* The South-down shepherds complain that this source of profit to their predecessors has disappeared under improved agriculture.—Ed.

† This is an error which Mitford corrected in a note to the second edition.—Ed.

year; as I had formerly remarked them in the month of October all the way from Chichester to Lewes wherever there were any shrubs and coverts: but not one bird of this sort came within my observation. I only saw a few larks and whin-chats, some rooks, and several kites and buzzards.

About summer a flight of cross-bills comes to the pine-groves about this house, but never makes any long stay.

The old tortoise, that I have mentioned in a former letter, still continues in this garden; and retired under ground about the twentieth of November, and came out again for one day on the thirtieth: it lies now buried in a wet swampy border under a wall facing to the south, and is enveloped at present in mud and mire!

Here is a large rookery round this house, the inhabitants of which seem to get their livelihood very easily; for they spend the greatest part of the day on their nest-trees when the weather is mild. These rooks retire every evening all the winter from this rookery, where they only call by the way, as they are going to roost in deep woods: at the dawn of day they always revisit their nest-trees, and are preceded a few minutes by a flight of daws, that act, as it were, as their harbingers.

RINGMER, near LEWES, *Dec.* 9, 1773.

LETTER LVII.

TO THE HONOURABLE DAINES BARRINGTON.

THE house-swallow,* or chimney-swallow, is undoubtedly the first comer of all the British *hirundines*; and appears in general on or about the thirteenth of April, as I have remarked from many years observation. Not but now and then a straggler is seen much earlier: and, in particular, when I was a boy I observed a swallow for a whole day together on a sunny warm Shrove Tuesday; which day could not fall out later than the middle of March, and often happened early in February.

It is worth remarking that these birds are seen first about lakes and mill-ponds; and it is also very particular, that if these early visitors happen to find frost and snow, as was the case of the two dreadful springs of 1770 and 1771, they immediately withdraw for a time. A circumstance this, much more in favour of hiding than migration; since it is much more probable that a bird should retire to its hybernaculum just at hand, than return for a week or two only to warmer latitudes.†

* Chimney swallow, *Hirundo rustica*, Linnæus.

† The probability is that such stragglers, when overtaken

The swallow, though called the chimney-swallow, by no means builds altogether in chimnies, but often within barns and out-houses against the rafters; and so she did in Virgil's time:—"Garrula quàm tignis nidos suspendat hirundo." "The twittering swallow hangs its nest from the beams."

In Sweden she builds in barns, and is called *ladu swala*, the barn-swallow. Besides, in the warmer parts of Europe there are no chimnies to houses, except they are English built: in these countries she constructs her nest in porches, and gate-ways, and galleries, and open halls.

Here and there a bird may affect some odd, peculiar place; as we have known a swallow build down the shaft of an old well, through which chalk had been formerly drawn up for the purpose of manure: but in general with us this *hirundo* breeds in chimnies; and loves to haunt those stacks where there is a constant fire, no doubt for the sake of warmth. Not that it can subsist in the immediate shaft where there is a fire; but prefers one adjoining to that of the kitchen, and disregards the perpetual smoke of that funnel, as I have often observed with some degree of wonder.

Five or six or more feet down the chimney does this little bird begin to form her nest about the middle of May, which consists, like that of the house-martin, of a crust or shell composed of dirt or mud, mixed with short pieces of straw to render it tough and permanent; with this difference, that whereas the shell of the martin is nearly hemispheric, that of the swallow is open at the top, and like half

by severe spring frosts, enter on "the sleep that knows no waking."—Ed.

a deep dish: this nest is lined with fine grasses, and feathers which are often collected as they float in the air.

Wonderful is the address which this adroit bird shows all day long in ascending and descending with security through so narrow a pass. When hovering over the mouth of the funnel, the vibrations of her wings acting on the confined air occasion a rumbling like thunder. It is not improbable that the dam submits to this inconvenient situation so low in the shaft, in order to secure her broods from rapacious birds, and particularly from owls, which frequently fall down chimnies, perhaps in attempting to get at these nestlings.

The swallow lays from four to six white eggs, dotted with red specks; and brings out her first brood about the last week in June, or the first week in July. The progressive method by which the young are introduced into life is very amusing: first, they emerge from the shaft with difficulty enough, and often fall down into the rooms below: for a day or so they are fed on the chimney-top, and then are conducted to the dead leafless bough of some tree, where sitting in a row they are attended with great assiduity, and may then be called perchers. In a day or two more they become flyers, but are still unable to take their own food; therefore they play about near the place where the dams are hawking for flies; and, when a mouthful is collected, at a certain signal given the dam and the nestling advance, rising towards each other, and meeting at an angle; the young one all the while uttering such a little quick note of gratitude and complacency, that a person must have paid very little regard to the

wonders of Nature that has not often remarked this feat.

The dam betakes herself immediately to the business of a second brood as soon as she is disengaged from her first; which at once associates with the first broods of house-martins; and with them congregates, clustering on sunny roofs, towers, and trees. This *hirundo* brings out her second brood towards the middle and end of August.

All the summer long the swallow is a most instructive pattern of unwearied industry and affection; for, from morning to night, while there is a family to be supported, she spends the whole day in skimming close to the ground, and exerting the most sudden turns and quick evolutions. Avenues, and long walks under hedges, and pasture-fields, and mown meadows where cattle graze, are her delight, especially if there are trees interspersed; because in such spots insects most abound. When a fly is taken, a smart snap from her bill is heard, resembling the noise at the shutting of a watch-case; but the motion of the mandibles is too quick for the eye.

The swallow, probably the male bird, is the *excubitor* to house-martins, and other little birds, announcing the approach of birds of prey. For as soon as a hawk appears, with a shrill alarming note he calls all the swallows and martins about him; who pursue in a body, and buffet and strike their enemy till they have driven him from the village, darting down from above on his back, and rising in a perpendicular line in perfect security. This bird will also sound the alarm and strike at cats when they climb on the roofs of houses, or otherwise approach the nests. Each species of *hirundo* drinks

as it flies along, sipping the surface of the water; but the swallow alone, in general, washes on the wing, by dropping into a pool for many times together:* in very hot weather house-martins and bank-martins also dip and wash a little.

The swallow is a delicate songster, and in soft sunny weather sings both perching and flying; on trees in a kind of concert, and on chimney-tops: it is also a bold flyer, ranging to distant downs and commons even in windy weather, which the other species seem much to dislike; nay, even frequenting exposed sea-port towns and making little excursions over the salt water.† Horsemen on wide downs are often closely attended by a little party of swallows for miles together, which plays before and behind them, sweeping around, and collecting all the sculking insects that are roused by the trampling of the horses' feet: when the wind blows hard, without this expedient, they are often forced to settle to pick up their lurking prey.

This species feeds much on little *coleoptera*, as well as on gnats and flies; and often settles on dug ground, or paths, for gravels to grind and digest its food. Before they depart, for some weeks, they forsake houses and chimnies to a bird, and roost in

* "Now suddenly he skims the glassy pool,
Now quaintly dips, and with an arrow's speed,
Whisks by. I love to lie awake, and hear
His morning song twittered to dawning day."

† Mr. M'Gillivray mentions an instance of their instinctive knowledge of the weather. It had been a rainy, gusty morning; presently some rooks rose from a sheltered wood, some swallows with them, and beat up against the wind; in half-an-hour the sun shone out in a clear sky, and a steady wind followed.—Ed.

trees;* and usually withdraw about the beginning of October; though some few stragglers may appear on at times till the first week in November.

[September 13, 1791. The congregating flocks of *hirundines* on the church and tower are very beautiful and amusing! When they fly off together from the roof, on any alarm, they quite swarm in the air. But they soon settle in heaps, and preening their feathers, and lifting up their wings to admit the sun, seem highly to enjoy the warm situation. Thus they spend the heat of the day, preparing for their emigration, and, as it were, consulting when and where they are to go. The flight about the church seems to consist chiefly of house-martins, about 400 in number: but there are other places of rendezvous about the village frequented at the same time †

* Mr. Hepburn describes such a scene very graphically. "Warned by the lengthening shadows and the increasing chilness of the air," he says, "the swallows join their companions, with whom they frolic together before retiring to the trees. When the morning has at last come, in which they are to bid farewell to their native land, they fly off in a body for the green meadows of merry England, there to linger a few weeks longer before they finally depart for the African coast. One 24th of September a flock passed over our reapers, casting no looks behind on the rural homesteads once held so dear, but rushing onwards in an undeviating course, and maintaining a sullen silence; I marked their flight until they blended with the blue ether. A few stragglers often remain behind. The latest I ever saw was a solitary individual in our stackyard on the 7th of October, 1839."—Ed.

† Of their migration the proofs are such as will scarcely admit of a doubt. Some we have already quoted. Sir Charles Wager and Captain Wright saw vast flocks of them at sea, when on their passage from one country to another. Our author, Mr. White, saw what he deemed the actual migration of these birds which he has described at page 98, and again in the above extract; and I once observed a large flock of house-martins myself on the roof of the church here at Catsfield, which acted exactly in the manner here described by

It is remarkable, that though most of them sit on the battlements and roof, yet many hang or cling for some time by their claws against the surface of the walls, in a manner not practised by them at any other time of their remaining with us.

The swallows seem to delight more in holding their assemblies on trees.

November 3, 1789. Two swallows were seen this morning at Newton vicarage-house, hovering and settling on the roofs and out-buildings. None have been observed at Selborne since October 11. It is very remarkable, that after the *hirundines* have disappeared for some weeks, a few are occasionally seen again: sometimes, in the first week in November, and that only for one day. Do they not withdraw and slumber in some hiding place during the interval? for we cannot suppose they had migrated to warmer climes and so returned again for one day. Is it not more probable that they are awakened from sleep, and like the bats are come forth to collect a little food? Bats appear at all seasons through the autumn and spring months, when the thermometer is at 50°, because then *phalænæ* and moths are stirring.

These swallows looked like young ones.]—OBSERVATIONS ON NATURE.

Some few pairs haunt the new and open streets of London next the fields, but do not enter, like the house-martin, the close and crowded parts of the city.

Both male and female are distinguished from their congeners by the length and forkedness of their

Mr. White, sometimes preening their feathers and spreading their wings to the sun, and then flying off all together, but soon returning to their former situation. The greatest part of these birds seemed to be young ones.—MARKWICK.

tails. They are undoubtedly the most nimble of all the species; and when the male pursues the female in amorous chase, they then go beyond their usual speed, and exert a rapidity almost too quick for the eye to follow.

After this circumstantial detail of the life and discerning στοργὴ of the swallow, I shall add, for your farther amusement, an anecdote or two not much in favour of their sagacity:—

A certain swallow built for two years together on the handles of a pair of garden shears that were stuck up against the boards in an out-house, and therefore must have her nest spoiled whenever that implement was wanted: and, what is stranger still, another bird of the same species built its nest on the wings and body of an owl that happened by accident to hang dead and dry from the rafter of a barn. This owl, with the nest on its wings, and with eggs in the nest, was brought as a curiosity worthy the most elegant private museum in Great Britain. The owner, struck with the oddity of the sight, furnished the bringer with a large shell, or conch, desiring him to fix it just where the owl hung: the person did as he was ordered, and the following year a pair, probably the same pair, built their nest in the conch, and laid their eggs.

The owl and the conch make a strange grotesque appearance, and are not the least curious specimens in that wonderful collection of art and nature.*

Thus is instinct in animals, taken the least out of

* Sir Ashton Lever's museum, was broken up many years ago. It was sold first by way of tontine, and the fortunate possessor kept it up for some years; but the public becoming indifferent to it, this fine collection of curiosities was sold by auction in more than 8000 lots.—ED.

its way, an undistinguishing, limited faculty; and blind to every circumstance that does not immediately respect self-preservation, or lead at once to the propagation or support of their species.

SELBORNE, *Sept.* 9, 1767.

LETTER LVIII.

TO THE HONOURABLE DAINES BARRINGTON.

I RECEIVED your favour of the eighth, and am pleased to find that you read my little history of the swallow with your usual candour: nor was I the less pleased to find that you made objections where you saw reason.

As to the quotations, it is difficult to say precisely which species of *hirundo* Virgil might intend in the lines in question, since the ancients did not attend to specific differences like modern naturalists: yet somewhat may be gathered, enough to incline me to suppose that in the two passages quoted the poet had his eye on the swallow.

In the first place the epithet *garrula* suits the swallow well, who is a great songster; and not the martin, which is rather a mute bird; and when it sings is so inward as scarce to be heard. Besides, if *tignum* in that place signifies a rafter rather than a beam, as it seems to me to do, then it must be the swallow that is alluded to, and not the martin; since the former does frequently build within the roof against the rafters; while the latter always, as far

as I have been able to observe, builds without the roof against eaves and cornices.

As to the simile, too much stress must not be laid on it: yet the epithet *nigra* speaks plainly in favour of the swallow, whose back and wings are very black; while the rump of the martin is milk-white, its back and wings blue, and all its under part white as snow. Nor can the clumsy motions (comparatively clumsy) of the martin well represent the sudden and artful evolutions and quick turns which Juturna gave to her brother's chariot, so as to elude the eager pursuit of the enraged Æneas. The verb *sonat* also seems to imply a bird that is somewhat loquacious.*

> "Nigra velut magnas domini cum divitis ædes
> Pervolat, et pennis alta atria lustrat hirundo,
> Pabula parva legens, nidisque loquacibus escas:
> Et nunc porticibus vacuis, nunc humida circum
> Stagna sonat."—(VIRG. *Æn.* xii. 473-477.)

We have had a very wet autumn and winter, so as to raise the springs to a pitch beyond anything since 1764; which was a remarkable year for floods and high waters. The land-springs, which we call levants, break out much on the downs of Sussex, Hampshire and Wiltshire. The country people say when the levants rise corn will always be dear; meaning that when the earth is so glutted with water as to send forth springs on the downs and uplands, that the corn-vales must be drowned; and so it has proved for these ten or eleven years past. For land-springs have never obtained more in the memory of man than during that period; nor has

* "As when the black swallow flies through the great palace of some wealthy lord, sweeping with its wings through the lofty halls, picking up tiny scraps of food for its chirping nestlings, at one time twittering in the empty porches, and at another round the watery ponds."

there been known a greater scarcity of all sorts of grain, considering the great improvements of modern husbandry. Such a run of wet seasons a century or two ago would, I am persuaded, have occasioned a famine. Therefore pamphlets and newspaper letters, that talk of combinations, tend to inflame and mislead; since we must not expect plenty till Providence sends us more favourable seasons.

The wheat of last year, all round this district, and in the county of Rutland, and elsewhere, yields remarkably bad: and our wheat on the ground, by the continual late sudden vicissitudes from fierce frost to pouring rains, looks poorly; and the turnips rot very fast.*

SELBORNE, *Feb.* 14, 1774.

* The drainage system which prevails in most of our wheat-growing counties renders the crop less dependent on fine seasons for their success than was the case at the date of this letter.—ED.

LETTER LIX.

TO THE HONOURABLE DAINES BARRINGTON.

THE sand-martin, or bank-martin (*Hirundo riparia*, Linnæus), is by much the least of any of the British *hirundines*; and, as far as we have ever seen, the smallest known *hirundo*: though Brisson asserts that there is one much smaller, and that is the *hirundo esculenta*.

But it is much to be regretted that it is scarce possible for any observer to be so full and exact as he could wish in reciting the circumstances attending the life and conversation of this little bird, since it is *fera naturâ*, at least in this part of the kingdom, disclaiming all domestic attachments, and haunting wild heaths and commons where there are large lakes; while the other species, especially the swallow and house-martin, are remarkably gentle and domesticated, and never seem to think themselves safe but under the protection of man.

Here are in this parish, in the sand-pits and banks of the lakes of Wolmer-forest, several colonies of these birds; and yet they are never seen in the village; nor do they at all frequent the cottages that are scattered about in that wild district. The only

instance I ever remember where this species haunts any building is at the town of Bishop's Waltham, in this county, where many sand-martins nestle and breed in the scaffold holes of the back-wall of William of Wykeham's stables: but then this wall stands in a very sequestered and retired enclosure, and faces upon a large and beautiful lake. Indeed this species seems so to delight in large waters, that no instance occurs of their abounding, but near vast pools or rivers: and in particular it has been remarked that they swarm in the banks of the Thames in some places below London-bridge.*

It is curious to observe with what different degrees of architectonic skill Providence has endowed birds of the same genus, and so nearly correspondent in their general mode of life!† for while the swallow and the house-martin discover the greatest address in raising and securely fixing crusts or shells of loam as *cunabula* for their young, the bank-martin terebrates a round and regular hole in the sand or earth, which is serpentine, horizontal, and about two feet deep. At the inner end of this burrow does this bird deposit, in a good degree of safety, her rude nest, consisting of fine grasses and feathers, usually goose-feathers, very inartificially laid together.

Perseverance will accomplish anything: though at first one would be disinclined to believe that this

* "When I consider the places in which I have met them," says M'Gillivray, "I must state it to be my opinion that they take up their abode in places favourable to mining, whether there be water near them or not."—ED.

† "Each creature hath a wisdom of its own;
The pigeons feed their tender offspring, crying,
When they are callow, but withdraw their food
When they are fledged, that they may teach them flying."—HERBERT.

weak bird, with her soft and tender bill and claws, should ever be able to bore the stubborn sand-bank without entirely disabling herself; yet with these feeble instruments have I seen a pair of them make great dispatch: and could remark how much they had scooped that day by the fresh sand which ran down the bank, and was of a different colour from that which lay loose and bleached in the sun.

In what space of time these little artists are able to mine and finish these cavities I have never been able to discover, for reasons given above; but it would be a matter worthy of observation, where it falls in the way of any naturalist to make his remarks.* This I have often taken notice of, that several holes of different depths are left unfinished at the end of summer. To imagine that these beginnings were intentionally made in order to be in the greater forwardness for next spring, is allowing perhaps too much foresight and *rerum prudentia* to a simple bird. May not the cause of these *latebræ*

* Mr. R. D. Duncan, a correspondent of M'Gillivray's, has carried out our author's hint, and described the operations of a pair of sand-swallows, seen through a telescope. Having spent a day or two in sporting about the Almond, which washed the foot of the bank they had selected, they grasped the perpendicular face of the bank with their claws, and steadied themselves by their tails, after which they commenced by picking a small hole with their bills; the hole was gradually enlarged by moving round and round, edging off the sand with the side of the bill, which they keep shut. The progress was slow at first, but when they could stand in their excavation they proceeded very rapidly, working mainly with their bills, and pushing out the sand with their feet; at one time the male, at another the female, being the excavator. They engaged in this work only a short time each morning, abandoning themselves to enjoyment throughout the rest of the day." The nests varied in depth from six inches to three feet; some horizontal, others descending and rising again, and others winding: but in all the nest was a little elevated above the entrance of the cell.—Ed

being left unfinished arise from their meeting in those places with strata too harsh, hard, and solid, for their purpose,* which they relinquish, and go to a fresh spot that works more freely? Or may they not in other places fall in with a soil as much too loose and mouldering, liable to founder, and threatening to overwhelm them and their labours?

One thing is remarkable—that, after some years, the old holes are forsaken and new ones bored; perhaps because the old habitations grow foul and fetid from long use, or because they may so abound with fleas as to become untenantable. This species of swallow moreover is strangely annoyed with fleas: and we have seen fleas, bed-fleas (*pulex irritans*), swarming at the mouths of these holes, like bees on the stools of their hives.

The following circumstance should by no means be omitted—that these birds do not make use of their caverns by way of hybernacula, as might be expected; since banks so perforated have been dug out with care in the winter, when nothing was found but empty nests.

The sand-martin arrives much about the same time with the swallow, and lays, as she does, from four to six white eggs. But as this species is *cryptogame,* carrying on the business of nidification, incubation, and the support of its young in the dark, it would not be so easy to ascertain the time of breeding, were it not for the coming forth of the broods, which appear much about the time, or rather

* The work is abandoned, according to Mr. Duncan, where stones or hard strata occur after the first few inches. Mr. Duncan and Mr. Weir both describe the sand-martin as the most social of our swallows, nestling in numerous communities, and often within a few inches of each other, flying in troops of a dozen to forty in pursuit of their prey.—Ed.

somewhat earlier than those of the swallow. The nestlings are supported in common like those of their congeners, with gnats and other small insects; and sometimes they are fed with *libellulæ* (dragon-flies) almost as long as themselves. In the last week in June we have seen a row of these sitting on a rail near a great pool as perchers; and so young and helpless, as easily to be taken by hand: but whether the dams ever feed them on the wing, as swallows and house-martins do, we have never yet been able to determine; nor do we know whether they pursue and attack birds of prey.*

When they happen to breed near hedges and enclosures, they are frequently dispossessed of their breeding holes by the house-sparrow, which is on the same account a fell adversary to house-martins.

These *hirundines* are no songsters, but rather mute, making only a little harsh noise when a person approaches their nests. They seem not to be of a sociable turn, never with us congregating with their congeners in the autumn. Undoubtedly they breed a second time, like the house-martin and swallow; and withdraw about Michaelmas.

Though in some particular districts they may happen to abound, yet in the whole, in the south of England at least, is this much the rarest species. For there are few towns or large villages but what

* Mr. Duncan, one of M'Gillivray's correspondents, satisfied himself that the pair he observed fed their young on the wing. "This feat is performed so suddenly," he says, "as almost to be imperceptible, and they appear to be in the act of teaching their young to fly. I took my station, one summer's morning, opposite four young birds on a ledge near the abandoned nest, around them the parents were silently capturing their prey, one or other of them carrying food every five minutes, and I calculate about 6000 insects are destroyed daily by each brood."—Ed.

abound with house-martins; few churches, towers, or steeples, but what are haunted by some swifts; scarce a hamlet or single cottage-chimney that has not its swallow; while the bank-martins, scattered here and there, live a sequestered life among some abrupt sand-hills, and in the precipitous banks of some few rivers.

These birds have a peculiar manner of flying; flitting about with odd jerks, and vacillations, not unlike the motions of a butterfly. Doubtless the flight of all *hirundines* is influenced by, and adapted to, the peculiar sort of insects which furnish their food. Hence it would be worth inquiry to examine what particular genus of insects affords the principal food of each respective species of swallow.

Notwithstanding what has been advanced above, some few sand-martins, I see, haunt the skirts of London, frequenting the dirty pools in Saint George's-Fields, and about White-Chapel. The question is where these build, since there are no banks or bold shores in that neighbourhood: perhaps they nestle in the scaffold holes of some old or new deserted building. They dip and wash as they fly sometimes, like the house-martin and swallow.

Sand-martins differ from their congeners in the diminutiveness of their size, and in their colour, which is what is usually called a mouse-colour. Near Valencia in Spain, they are taken, says Willughby, and sold in the markets for the table; and are called by the country people, probably from their desultory jerking manner of flight, *Papilion de Montagna.*

SELBORNE, *Feb.* 26, 1774.

LETTER LX.

TO THOMAS PENNANT, ESQ.

BEFORE your letter arrived, and of my own accord, I had been remarking and comparing the tails of the male and female swallow, and this ere any young broods appeared; so that there was no danger of confounding the dams with their *pulli*: and besides, as they were then always in pairs, and busied in the employ of nidification, there could be no room for mistaking the sexes, nor the individuals of different chimnies the one for the other. From all my observations, it constantly appeared that each sex has the long feathers in its tail that give it that forked shape; with this difference, that they are longer in the tail of the male than in that of the female.

Nightingales, when their young first come abroad, and are helpless, make a plaintive and a jarring noise; and also a snapping or cracking, pursuing people along the hedges as they walk: these last sounds seem intended for menace and defiance.*

* After the young are hatched the Nightingale is seldom heard to sing; its note is now low and hoarse, and is supposed to be an expression of anxiety for its young.—ED.

The grasshopper-lark chirps all night in the height of summer.

Swans turn white the second year, and breed the third.

Weasels prey on moles, as appears by their being sometimes caught in mole-traps.

Sparrow-hawks sometimes breed in old crows' nests, and the kestril in churches and ruins.

There are supposed to be two sorts of eels in the island of Ely.* The threads sometimes discovered in eels are perhaps their young: the generation of eels is very dark and mysterious.

Hen-harriers breed on the ground, and seem never to settle on trees.

[Of this bold bird White afterwards writes in his Observations:—"A gentleman flushed a pheasant in a wheat stubble, and shot at it; when, notwithstanding the report of the gun, it was immediately pursued by the blue hawk known by the name of the hen-harrier, but escaped into some covert. He then sprung a second, and a third, in the same field, that got away in the same manner; the hawk hovering round him all the while that he was beating the field, conscious no doubt of the game that lurked in the stubble. Hence we may conclude that this bird of prey was rendered very daring and bold by hunger, and that hawks cannot always seize their game when

* Three species of eels have been pretty well made out by Mr. Yarrell. The thread-like bodies referred to are supposed to have been intestinal worms by which they are much infested. Their propagation has been rendered more intelligible by Mr. Yarrell's investigations. They are now found to spawn like other fishes; the roe of the female being filled with myriads of *ova*, which are deposited in the bottom of rivers in winter.—ED.

they please. We may farther observe, that they cannot pounce on their quarry on the ground, where it might be able to make a stout resistance, since so large a fowl as a pheasant could not but be visible to the piercing eye of a hawk, when hovering over the field. Hence that propensity of cowring and squatting till they are almost trod on, which no doubt was intended as a mode of security: though long rendered destructive to the whole race of *gallinæ* by the invention of nets and guns.]

When redstarts shake their tails they move them horizontally, as dogs do when they fawn: the tail of a wagtail, when in motion, bobs up and down like that of a jaded horse.

Hedge-sparrows have a remarkable flirt with their wings in breeding-time; as soon as frosty mornings come they make a very piping plaintive noise.

Many birds which become silent about Midsummer reassume their notes again in September; as the thrush, blackbird, wood-lark, willow-wren, &c.; hence August is by much the most mute month, the spring, summer, and autumn through. Are birds induced to sing again because the temperament of autumn resembles that of spring?

Linnæus ranges plants geographically; palms inhabit the tropics, grasses the temperate zones, and mosses and lichens the polar circles; no doubt animals may be classed in the same manner with propriety.

House-sparrows build under eaves in the spring; as the weather becomes hotter they get out for coolness, and nest in plum-trees and apple-trees. These birds have been known sometimes to build in rooks' nests, and sometimes in the forks of boughs under rooks' nests.

As my neighbour was housing a rick he observed that his dogs devoured all the little red mice that they could catch, but rejected the common mice; and that his cats ate the common mice, refusing the red.

Red-breasts sing all through the spring, summer, and autumn.* The reason that they are called autumn songsters is, because in the two first seasons their voices are drowned and lost in the general chorus; in the latter their song becomes distinguishable. Many songsters of the autumn seem to be the young cock red-breasts of that year: notwithstanding the prejudices in their favour, they do much mischief in gardens to the summer-fruits. They eat also the berries of the ivy, the honeysuckle, and the *euonymus europæus,* or spindle-tree.

The titmouse, which early in February begins to make two quaint notes, like the whetting of a saw, is the marsh titmouse; the great titmouse sings with three cheerful joyous notes, and begins about the same time.†

* "At all seasons," says M'Gillivray, "when the weather is fine, it may occasionally be heard chanting its short, mellow, and enlivening song. In calm summer evenings, two of them perched on a tree or bush will often respond to each other's richly modulated song; it may even be heard to sing in dull rainy weather when no other music is heard in the grove." "During the autumn, and amidst the desolations of winter," says Mr. Weir, "when almost all the songsters of the woods are silent, we hear the pleasing song of the robin with delight." In the spring, as early as February, they are seen in pairs, and young have been found in their nests as early as the end of March, although they are quite solitary in the depth of winter.—ED.

† The ordinary cry of the Great-tit, *Parus major*, is a loud chirp, followed by a harsh chatter like *cher-r-r-r-r-ik*. In spring and summer the sounds emitted have some resemblance to that produced by sharpening the teeth of a saw with

Wrens sing all the winter through, frost excepted.

House-martins came remarkably late this year both in Hampshire and Devonshire: is this circumstance for or against either hiding or migration?

Most birds drink sipping at intervals; but pigeons take a long continued draught, like quadrupeds.

Notwithstanding what I have said in a former letter, no grey crows were ever known to breed on Dartmoor; it was my mistake.

The appearance and flying of the *scarabæus solstitialis*, or fern-chafer, commence with the month of July, and cease about the end of it. These scarabs are the constant food of *caprimulgi*, or fern-owls, through that period. They abound on the chalky downs and in some sandy districts, but not in the clays.

In the garden of the Black-bear Inn in the town of Reading is a stream or canal running under the stables and out into the fields on the other side of the road: in this water are many carps, which lie rolling about in sight, being fed by travellers, who amuse themselves by tossing them bread: but as soon as the weather grows at all severe these fishes are no longer seen, because they retire under the

a file; "very loud notes for so small a bird, and capable of being heard nearly half a mile off," says M'Gillivray. The Blue-tit, *P. cæruleus*, becomes very noisy in spring; its most common cry may be reduced to something like *chika, chika, chicka, chee, chee*, as it creeps, jerks, and flutters upon the twigs of trees, or bounces off to some other branch. The Cole-tit, *P. ater*, utters a single sharp chirping note while searching for food; in the spring its note is loud and clear, resembling the syllables *che-chre, che-chre*, or, as Mr. Hepburn has it, *if-tree, if-tree*, which is heard a great distance off. The Marsh-tit, *P. palustris*, emits a variety of chattering notes, its song resembling the *chicka, chicka, che* of the blue-tit.—Ed.

stables, where they remain till the return of spring. Do they lie in a torpid state? if they do not, how are they supported?

The note of the white-throat, which is continually repeated, and often attended with odd gesticulations on the wing, is harsh and displeasing. These birds seem of a pugnacious disposition; for they sing with an erected crest and attitudes of rivalry and defiance; are shy and wild in breeding-time, avoiding neighbourhoods, and haunting lonely lanes and commons; nay even the very tops of the Sussex-downs, where there are bushes and covert; but in July and August they bring their broods into gardens and orchards, and make great havock among the summer fruits.*

The black-cap has in common a full, sweet, deep, loud, and wild pipe; yet that strain is of short con-

* The correctness of the whole of this passage is called in question by the Dean of Manchester. He denies that it is either shy, pugnacious, or destructive to fruits. He kept five cocks in the same cage who lived in perfect amity. He never knew an instance of their attacking cherries, although he admits that they sometimes attack green peas. Its shyness will probably depend on circumstances; where it is surrounded by a dense population not much given to disturb it the natural shyness will probably disappear. In more remote districts it flits incessantly among the twigs, and if pursued it generally keeps on the other side of the hedge, flying off to short distances, warbling its few pleasant modulated notes as it flies or the moment it alights, then takes flight again with curious jerks and gesticulations. They combine to repel any stray cat who enters their domain; and if you approach its nest it comes up with great courage, scolding vehemently in a churring sort of note, while it tries by short flights to attract you from the spot. Its natural food is insects and larvæ of various kinds; no seeds have been found in its stomach, which is indeed too small for their reception in any quantity; but it is pretty well established that they do feed, more or less, on the pulp of cherries, raspberries, and other fruits. At the same time the gardener may be assured that he is benefited by their pre-

tinuance, and his motions are desultory; but when that bird sits calmly and engages in song in earnest, he pours forth very sweet, but inward melody, and expresses great variety of soft and gentle modulations, superior perhaps to those of any of our warblers, the nightingale excepted.* Black-caps mostly haunt orchards and gardens; while they warble, their throats are wonderfully distended.

The song of the redstart is superior,† though

sence; they are his best assistants in keeping down his insect enemies. The song of the White-throat is not pleasing, except in connection with that of other birds, to which it gives variety and contrast.—Ed.

* Softer, and of greater compass than the Robin, mellower, and more modulated than the Thrush; the song of the Black-cap is "loud, clear, and rapid, and, in its way, almost equals that of the Nightingale," says Mr. Neville Wood. "It sings more constantly than any of its congeners." "It is a real mocking-bird," says Symes. "I have heard it imitate the Nightingale so exactly that I have been deceived; also the Blackbird, Thrush, and the Garden Warbler (Pettichaps)." "Listen," says M'Gillivray, "to the strains which issue from that broad plane-tree, so loud, so clear, so melodious, so surpassingly beautiful, that surely never bird sang more sweetly. It is a Thrush I know, by that peculiar inflation. Yet no, it cannot be, for the notes are not so loud, nor is the strain so broken; the notes follow each other with rapidity—now the enunciation is hurried, anon more deliberate, but always distinct, and never strained or slurred over by haste. It pours forth its rich strain of music, not imitative, but in gladness, the spontaneous, unpremeditated, and unborrowed strains that nature has taught." The males are exceedingly shy, rarely seen while singing; but, seated on some rude, shaded, mossy bank, near some plane-tree, which he is known to haunt, it will not be long before he is visible; for, when undisturbed, he seeks some conspicuous station, as the top of the tree, whence he pours forth his song.—Ed.

† The only Redstart known to us otherwise than as a straggler is *Ruticilla Phœnicurus*, Linn. and its low and plaintive song scarcely bears out Mr. White's assertion. It is a shy bird, and difficult of approach; but in the breeding season the male stations himself not far from the nest, at-

somewhat like that of the white-throat: some birds have a few more notes than others. Sitting very placidly on the top of a tall tree in a village, the cock sings from morning till night: he affects neighbourhoods, and avoids solitude, and loves to build in orchards and about houses; with us he perches on the vane of a tall maypole.

The fly-catcher is of all our summer birds the most mute and the most familiar; it also appears the last of any. It builds in a vine, or a sweetbriar, against the wall of an house, or in the hole of a wall, or on the end of a beam or plate, and often close to the post of a door where people are going in and out all day long. This bird does not make the least pretension to song, but uses a little inward wailing note when it thinks its young in danger from cats or other annoyances: it breeds but once, and retires early.

Selborne parish alone can and has exhibited at times more than half the birds that are ever seen in all Sweden; the former has produced more than one hundred and twenty species, the latter only two hundred and twenty-one. Let me add also that it has shown near half the species that were ever known in Great Britain; Sweden having two hundred and twenty-one, Great Britain two hundred and fifty-two species.*

tunes his pipe, and sings his pleasant little song at early dawn, and in the twilight. At other times it is confined to a long plaintive *oi-chit, oi-chit*, as it flits along some stone wall, varying its movement by catching an insect on the wing.—Ed.

* Ray enumerates, as White tells us, a hundred and ninety species as known in 1678. The number known at present is three hundred, and about twenty stragglers or of doubtful species.—Ed.

On a retrospect, I observe that my long letter carries with it a quaint and magisterial air, and is very sententious; but, when I recollect that you requested stricture and anecdote, I hope you will pardon the didactic manner for the sake of the information it may happen to contain.

SELBORNE, *Sept.* 2, 1774.

LETTER LXI.

TO THOMAS PENNANT, ESQ.

IT is matter of curious inquiry to trace out how those species of soft-billed birds, that continue with us the winter through, subsist during the dead months. The imbecility of birds seems not to be the only reason why they shun the rigour of our winters; for the robust wry-neck* (so much resembling the hardy race of wood-peckers) migrates, while the feeble little golden-crowned wren, that shadow of a bird, braves our severest frosts without availing himself of houses or villages, to which most of our winter-birds crowd in distressful seasons, while this keeps aloof in fields and woods; but perhaps this may be the reason why they may often perish, and why they are almost as rare as any bird we know.†

* "Wrynecks appear on the grass-plots and walks; they walk a little as well as hop, and thrust their bills into the turf, in quest, I conclude, of ants, which are their food. While they hold their bills in the grass, they draw out their prey with their tongues, which are so long as to be coiled round their heads," says White in his "Observations."

† Mr. Selby remarked for several years that the Golden-crested Wren, *Regulus auricapillus*, became very abundant along the coast of Northumberland; and in 1822, after a severe

I have no reason to doubt but that the soft-billed birds, which winter with us, subsist chiefly on insects in their aurelia state. All the species of wag-tails in severe weather haunt shallow streams near their spring heads, where they never freeze; and, by wading, pick out the aurelias of the genus of *Phryganeæ*, &c.*

Hedge-sparrows frequent sinks and gutters in hard weather, where they pick up crumbs and other sweepings: and in mild weather they procure worms, which are stirring every month in the year, as any one may see that will only be at the trouble of taking a candle to a grass-plot on any mild winter's night. Red-breasts and wrens in the winter haunt out-houses, stables, and barns, where they find spiders and flies that have laid themselves up during the cold season. But the grand support of the soft-billed birds in winter is that infinite profusion of

gale, which commenced on the 24th of October at N.E., and veered about to E. and S. by E., on the morning of the 26th the Golden-crests arrived by hundreds upon the beach, so fatigued and overcome by the change of wind and the length of their journey as to drop the moment they reached land. Great numbers were in consequence taken by the hand, unable to rise or escape from their pursuers. This flight he ascertained to have extended beyond Berwick northwards, and as far as Whitby southwards. They soon spread over the country, their numbers decreasing. In January a severe snow-storm occurred, followed by a thaw and a second and more severe frost, in which they all disappeared; and none were seen in the district till October, when a few arrived: and all that year he looked for the Golden-crest during an excursion in Scotland in vain. He supposes this great flight arrived from the North of Europe. Bechstein states that in Germany they are seen passing southward in October, and northward in March, but that flocks of them remain with them, as they certainly do with us, all the year, shifting probably from north to south, and back again within a limited range of country.—Ed.

* Derham's "Physico-Theology."

aureliæ of the *lepidoptera ordo*, which is fastened to the twigs of trees and their trunks; to the pales and walls of gardens and buildings; and is found in every cranny and cleft of rock or rubbish, and even in the ground itself.

Every species of titmouse winters with us; they have what I call a kind of intermediate bill between the hard and the soft, between the Linnæan genera of *Fringilla* and *Motacilla*. One species alone spends its whole time in the woods and fields, never retreating for succour in the severest seasons, to houses and neighbourhoods; and that is the delicate long-tailed titmouse,* which is almost as minute as the golden-crowned wren: but the blue titmouse, or nun (*Parus cæruleus*), the cole-mouse (*Parus ater*), the great black-headed titmouse (*Parus fringillago*, now *major*), and the marsh titmouse (*Parus palustris*), all resort, at times, to buildings; and in hard weather particularly. The great titmouse, driven by stress of weather, much frequents houses, and, in deep snows, I have seen this bird, while it hung with its back downwards (to my no small delight and admiration), draw straws lengthwise from out the eaves of thatched houses, in order to pull out the flies that were concealed between them, and that in such numbers that they quite defaced the thatch, and gave it a ragged appearance.

* The Mufflin or Longtailed-tit, *Parus caudatus*, Linn. now *Mecistura caudata*, the smallest of British birds except the Golden-crested Wren. The Tits are five in number:—the Great, or Ox-eye tit, *Parus major*, Linn. here described; the Blue-tit, *P. cæruleus;* the Cole-tit, *P. ater;* the Marsh-tit, *P. palustris;* and the Crested-tit, *P. cristatus*. They are all little creatures, some of them not more than four inches in length, haunting the woods and nestling in holes and cavities of walls and trees.—Ed.

The blue titmouse, or nun, is a great frequenter of houses, and a general devourer. Besides insects, it is very fond of flesh; for it frequently picks bones on dunghills: it is a vast admirer of suet, and haunts butchers' shops. When a boy, I have known twenty in a morning caught with snap mouse-traps, baited with tallow or suet. It will also pick holes in apples left on the ground, and be well entertained with the seeds on the head of a sun-flower. The blue, marsh, and great titmice will, in very severe weather, carry away barley and oat straws from the sides of ricks.

How the wheat-ear and whin-chat support themselves in winter cannot be so easily ascertained, since they spend their time on wild heaths and warrens; the former especially, where there are stone quarries: most probably it is that their maintenance arises from the *aureliæ* of the *lepidoptera ordo*, which furnish them with a plentiful table in the wilderness.

LETTER LXII.

TO THE HONOURABLE DAINES BARRINGTON.

AS the swift or black martin * is the largest of the British *hirundines*, so is it undoubtedly the latest comer. For I remember but one instance of its appearing before the last week in April: and in some of our late frosty, harsh springs, it has not been seen till the beginning of May. This species usually arrives in pairs.

The swift, like the sand-martin, is very defective in architecture, making no crust, or shell, for its nest; but forming it of dry grasses and feathers, very rudely and inartificially put together. With all my attention to these birds, I have never been able once to discover one in the act of collecting or carrying in materials: so that I have suspected (since their nests are exactly the same) that they sometimes usurp upon the house-sparrows, and expel them, as sparrows do the house and sand-martin;

* *Cypselus apus*, Linnæus, or *Hirundo apus*, is sometimes classed in the same genus as the swallow; but later naturalists make a separate family, which includes all the swifts, of which M'Gillivray describes two species: the present *C. apus* and *C. melba*, the White-bellied Swift.—Ed.

well remembering that I have seen them squabbling together at the entrance of their holes; and the sparrows up in arms, and much disconcerted at these intruders. And yet I am assured by a nice observer in such matters, that they do collect feathers for their nests in Andalusia; and that he has shot them with such materials in their mouths.

Swifts, like sand-martins, carry on the business of nidification quite in the dark, in crannies of castles, and towers, and steeples, and upon the tops of the walls of churches under the roof; and therefore cannot be so narrowly watched as those species that build more openly: but, from what I could ever observe, they begin nesting about the middle of May; and I have remarked, from eggs taken, that they have sat hard by the ninth of June. In general they haunt tall buildings, churches, and steeples, and breed only in such: yet in this village some pairs frequent the lowest and meanest cottages, and educate their young under those thatched roofs. I remember but one instance where they bred out of buildings; and that was in the sides of a deep chalk-pit near the town of Odiham, in this county, where I have seen many pairs entering the crevices, and skimming and squeaking round the precipices.

As I have regarded these amusive birds with no small attention, if I should advance something new and peculiar with respect to them, and different from all other birds, I might perhaps be credited; especially as my assertion is the result of many years exact observation. The fact that I would advance is, that swifts propagate on the wing: and I would wish any nice observer, that is startled at this supposition, to use his own eyes, and I think he will

soon be convinced. In another class of animals, viz. the insect, nothing is so common as to see the different species of many genera in conjunction as they fly. The swift is almost continually on the wing; and as it never settles on the ground, on trees, or roofs, would seldom find opportunity for amorous rites, was it not enabled to indulge them in the air. If any person would watch these birds of a fine morning in May, as they are sailing round at a great height from the ground, he would see, every now and then, one drop on the back of another, and both of them sink down together for many fathoms with a loud piercing shriek.* This I take to be the juncture when the business of generation is carrying on.

As the swift eats, drinks, collects materials for its nest, and, as it seems, propagates on the wing; it appears to live more in the air than any other bird, and to perform all functions there save those of sleeping and incubation.

This *hirundo* differs widely from its congeners in laying invariably but two eggs at a time, which are milk-white, long, and peaked at the small end; whereas the other species lay at each brood from four to six. It is a most alert bird, rising very early, and retiring to roost very late; and is on the wing in the height of summer at least sixteen hours. In the longest days it does not withdraw to rest till

* While admitting the facts as related, M'Gillivray doubts the inference White draws, looking upon them as indications of the hostility of rival males. In dry sunny weather they frequently utter a long loud scream as they pursue their prey; apparently the scream is indicative of the pleasures of the chase. The eggs are two or three, pure white, and elongated, being about an inch long, and a little over half-an-inch in breadth.—Ed.

a quarter before nine in the evening, being the latest of all day birds. Just before they retire whole groups of them assemble high in the air, and squeak, and shoot about with wonderful rapidity. But this bird is never so much alive as in sultry thundery weather, when it expresses great alacrity, and calls forth all its powers. In hot mornings several, getting together in little parties, dash round the steeples and churches, squeaking as they go in a very clamorous manner: these, by nice observers, are supposed to be males serenading their sitting hens; and not without reason, since they seldom squeak till they come close to the walls or eaves, and since those within utter at the same time a little inward note of complacency.

When the hen has sat hard all day, she rushes forth for a few minutes, just as it is almost dark, to stretch and relieve her weary limbs, and snatch scanty meal, and then returns to her duty of incubation. Swifts, when wantonly and cruelly shot while they have young, discover a little lump of insects in their mouths, which they pouch and hold under their tongue. In general they feed in a much higher district than the other species; a proof that gnats and other insects do also abound to a considerable height in the air: they also range to vast distances; since locomotion is no labour to them, who are endowed with such wonderful powers of wing. Their powers seem to be in proportion to their levers; and their wings are longer in proportion than those of almost any other bird. When they mute, or ease themselves in flight, they raise their wings, and make them meet over their backs.

At some certain times in the summer I had re-

marked that swifts were hawking very low for hours together over pools and streams; and could not help inquiring into the object of their pursuit that induced them to descend so much below their usual range. After some trouble, I found that they were taking *phryganeæ, ephemeræ* and *libellulæ* (caduce-flies, may-flies, and dragon-flies) that were just emerged out of their aurelia state. I then no longer wondered that they should be so willing to stoop for a prey that afforded them such plentiful and succulent nourishment.

They bring out their young about the middle or latter end of July: but as these never become perchers, nor, that ever I could discern, are fed on the wing by their dams, the coming forth of the young is not so notorious as in the other species.

On the thirtieth of last June I untiled the eaves of a house where many pairs build, and found in each nest only two squab, naked *pulli*: on the eighth of July I repeated the same inquiry, and found they had made very little progress towards a fledged state, but were still naked and helpless. From whence we may conclude that birds whose way of life keeps them perpetually on the wing would not be able to quit their nest till the end of the month. Swallows and martins, that have numerous families, are continually feeding them every two or three minutes; while swifts, that have but two young to maintain, are much at their leisure, and do not attend on their nests for hours together.

Sometimes they pursue and strike at hawks that come in their way; but not with that vehemence and fury that swallows express on the same occasion.

They are out all day long in wet days, feeding about, and disregarding still rain: from whence two things may be gathered; first, that many insects abide high in the air, even in rain; and next, that the feathers of these birds must be well preened to resist so much wet. Windy, and particularly windy weather with heavy showers, they dislike; and on such days withdraw, and are scarce ever seen.

There is a circumstance respecting the colour of swifts, which seems not to be unworthy our attention. When they arrive in the spring they are all over of a glossy, dark, soot-colour, except their chins, which are white; but, by being all day long in the sun and air, they become quite weather-beaten and bleached before they depart, and yet they return glossy again in the spring. Now, if they pursue the sun into lower latitudes, as some suppose, in order to enjoy a perpetual summer, why do they not return bleached? Do they not rather perhaps retire to rest for a season, and at that juncture moult and change their feathers, since all other birds are known to moult soon after the season of breeding?

Swifts are very anomalous in many particulars, dissenting from all their congeners not only in the number of their young, but in breeding but once in a summer; whereas all the other British *hirundines* breed invariably twice. It is past all doubt that swifts can breed but once, since they withdraw in a short time after the flight of their young, and some time before their congeners bring out their second broods. We may here remark, that, as swifts breed but once in a summer, and only two* at a time, and the other *hirundines* twice, the latter, who lay from

* Mr. M'Gillivray says two or three.—Ed.

four to six eggs, increase at an average five times as fast as the former.

But in nothing are swifts more singular than in their early retreat. They retire, as to the main body of them, by the tenth of August, and sometimes a few days sooner: and every straggler invariably withdraws by the twentieth, while their congeners, all of them, stay till the beginning of October; many of them all through that month, and some occasionally to the beginning of November. This early retreat is mysterious and wonderful, since that time is often the sweetest season in the year. But, what is more extraordinary, they begin to retire still earlier in the most southerly parts of Andalusia, where they can be no ways influenced by any defect of heat; or, as one might suppose, defect of food. Are they regulated in their motions with us by a failure of food, or by a propensity to moulting, or by a disposition to rest after so rapid a life, or by what? This is one of those incidents in natural history that not only baffles our searches, but almost eludes our guesses!

These *hirundines* never perch on trees or roofs, and so never congregate with their congeners. They are fearless while haunting their nesting-places, and are not to be scared by a gun; and are often beaten down with poles and cudgels as they stoop to go under the eaves. Swifts are much infested with those pests to the genus called *hippoboscæ*, (*anaperæ hirundinis*, Leach,) and often wriggle and scratch themselves, in their flight, to get rid of that clinging annoyance.

Swifts are no songsters, and have only one harsh screaming note; yet there are ears to which it is not

displeasing, from an agreeable association of ideas, since that note never occurs but in the most lovely summer weather.

They never settle on the ground but through accident; and when down can hardly rise, on account of the shortness of their legs and the length of their wings: neither can they walk, but only crawl; but they have a strong grasp with their feet, by which they cling to walls. Their bodies being flat, they can enter a very narrow crevice; and when they cannot pass on their bellies they will turn up edgewise.

The particular formation of the foot discriminates the swift from all the British *hirundines*; and indeed from all other known birds, the *hirundo melba*, or great white-bellied swift of Gibraltar, excepted; for it is so disposed as to carry "omnes quatuor digitos anticos"—"all its four toes forward;" besides the least toe, which should be the back one, consists of one bone only, and the other three of only two apiece. A construction most rare and peculiar, but nicely adapted to the purposes in which their feet are employed. This, and some peculiarities attending the nostrils and under mandible, have induced a discerning naturalist* to suppose that this species might constitute a genus by itself.

In London a party of swifts frequent the Tower, playing and feeding over the river just below the bridge: others haunt some of the churches of the Borough next the fields; but do not venture, like the house-martin, into the close crowded part of the town.

* John Antony Scopoli, of Carniola, M.D. It will be seen that Jenyns, M'Gillivray, Yarrell, and other recent naturalists, adopt this learned author's views, although the name *Cypselus* used by Illiger has been adopted.—ED.

The Swedes have bestowed a very pertinent name on this swallow, calling it "ring swala," from the perpetual rings or circles that it takes round the scene of its nidification.

Swifts feed on *coleoptera*, or small beetles with hard cases over their wings, as well as on the softer insects; but it does not appear how they can procure gravel to grind their food, as swallows do, since they never settle on the ground. Young ones, overrun with *hippoboscæ*, are sometimes found, under their nests, fallen to the ground; the number of vermin rendering their abode insupportable any longer. They frequent in this village several abject cottages; yet a succession still haunts the same unlikely roofs: a good proof this that the same birds return to the same spots. As they must stoop very low to get up under these humble eaves, cats lie in wait, and sometimes catch them on the wing.

On the fifth of July, 1775, I again untiled part of a roof over the nest of a swift. The dam sat in the nest; but so strongly was she affected by her natural στοργὴ for her brood, which she supposed to be in danger, that, regardless of her own safety, she would not stir, but lay sullenly by them, permitting herself to be taken in hand. The squab young we brought down and placed on the grass-plot, where they tumbled about, and were as helpless as a new-born child. While we contemplated their naked bodies, their unwieldy disproportioned *abdomina*, and their heads too heavy for their necks to support, we could not but wonder when we reflected that these shiftless beings in a little more than a fortnight would be able to dash through the air almost with the inconceivable swiftness of a meteor; and perhaps, in their

emigration, must traverse vast continents and oceans as distant as the equator. So soon does Nature advance small birds to their ἡλικία, or state of perfection; while the progressive growth of men and large quadrupeds is slow and tedious!

SELBORNE, *Sept.* 28, 1774.

LETTER LXIII.

TO THE HONOURABLE DAINES BARRINGTON.

BY means of a straight cottage-chimney I had an opportunity this summer of remarking at my leisure, how swallows ascend and descend through the shaft; but my pleasure, in contemplating the address with which this feat was performed to a considerable depth in the chimney, was somewhat interrupted by apprehensions lest my eyes might undergo the same fate with those of Tobit.

Perhaps it may be some amusement to you to hear at what times the different species of *hirundines* arrived this spring in three very distant counties of this kingdom. With us the swallow was seen first on April the 4th, the swift on April the 24th, the bank-martin on April the 12th, and the house-martin not till April the 30th. At South Zele, Devonshire, swallows did not arrive till April the 25th; swifts, in plenty, on May the 1st; and house-martins not till the middle of May. At Blackburn, in Lancashire, swifts were seen April the 28th, swallows April the 29th, house-martins May

the 1st. Do these different dates in such distant districts, prove anything for or against migration?

A farmer near Weyhill fallows his land with two teams of asses; one of which works till noon, and the other in the afternoon. When these animals have done their work, they are penned all night, like sheep, on the fallow. In the winter they are confined and foddered in a yard, and make plenty of dung.

Linnæus says that hawks "make a truce with other birds as long as the cuckoo is heard:" "paciscuntur inducias cum avibus, quamdiu cuculus cuculat:" but it appears to me that, during that period, many little birds are taken and destroyed by birds of prey, as may be seen by their feathers left in lanes and under hedges.

The missel-thrush is, while breeding, fierce and pugnacious, driving such birds as approach its nest with great fury to a distance. The Welsh call it "pen y llwynn," the head or master of the coppice. He suffers no magpie, jay, or blackbird to enter the garden where he haunts; and is, for the time, a good guard to the new-sown legumens. In general he is very successful in the defence of his family; but once I observed in my garden, that several magpies came determined to storm the nest of a missel-thrush: the dams defended their mansion with great vigour, and fought resolutely for their "faith and for their homes:" *pro aris et focis;* but numbers at last prevailed, they tore the nest to pieces, and swallowed the young alive.

[Thrushes during long droughts are of great service in hunting out shell snails,* which they pull

* Of the truth of this I have been an eye-witness, having seen the common thrush feeding on the shell snail.—MARKWICK.

in pieces for their young, and are thereby very serviceable in gardens. Missel-thrushes do not destroy the fruit in gardens like the other species of *turdi* but feed on the berries of misseltoe, and in the spring on ivy-berries, which then begin to ripen.* In the summer, when their young become fledged, they leave neighbourhoods, and retire to sheep-walks and wild commons. This species of thrush, though wild at other times, delights to build near houses, and in frequented walks and gardens.]

In the season of nidification the wildest birds are comparatively tame. Thus the ring-dove breeds in my fields, though they are continually frequented; and the missel-thrush, though most shy and wild in the autumn and winter, builds in my garden close to a walk where people are passing all day long.

Wall-fruit abounds with me this year; but my grapes, that used to be forward and good, are at present backward beyond all precedent: and this is not the worst of the story; for the same ungenial weather, the same black cold solstice, has injured the more necessary fruits of the earth, and discoloured and blighted our wheat. The crop of hops promises to be very large.

* In the very early part of this spring (1797) a bird of this species used to sit every morning on the top of some very high elms close by my windows, and delight me with its charming song, attracted thither, probably, by some ripe ivy-berries that grew near the place.

I have remarked something like the latter fact, for I remember, many years ago, seeing a pair of these birds fly up repeatedly and attack some larger bird, which I suppose disturbed their nest in my orchard, uttering at the same time violent shrieks. Since writing the above, I have seen more than once a pair of these birds attack some magpies that had disturbed their nest, with great violence and loud shrieks.—MARKWICK.

Frequent returns of deafness incommode me sadly, and half disqualify me as a naturalist; for, when those fits are upon me, I lose all the pleasing notices and little intimations arising from rural sounds; and May is to me as silent and mute with respect to the notes of birds, &c. as August. My eyesight is, thank God, quick and good; but with respect to the other sense, I am, at times, disabled:

"And Wisdom at one entrance quite shut out."

SELBORNE, *Sept.* 13, 1774.

LETTER LXIV.

TO THOMAS PENNANT, ESQ.

SOME future faunist, a man of fortune, will, I hope, extend his visits to the kingdom of Ireland; a new field, and a country little known to the naturalist.* He will not, it is to be wished, undertake that tour unaccompanied by a botanist, because the mountains have scarcely been sufficiently examined; and the southerly counties of so mild an island may possibly afford some plants little to be expected within the British dominions. A person of a thinking turn of mind will draw many just remarks from the modern improvements of that country, both in arts and agriculture, where premiums obtained, long before they

* Thomson's "Birds of Ireland" leaves little to be desired so far as the ornithology of that country is concerned; its *fauna* has also been included in all recent contributions to British natural history. The pages of Montagu, Yarrell, M'Gillivray, Morris, and Selby being enriched by able communications from that country, written by accurate observers where the writers themselves had not opportunities. These observations have been invaluable to science. At the same time, while the scientific journals are full of contributions to Irish botany, it is to be regretted that no collected series of Irish plants has been attempted.—ED.

were heard of with us. The manners of the wild natives, their superstitions, their prejudices, their sordid way of life, will extort from him many useful reflections. He should also take with him an able draughtsman; for he must by no means pass over the noble castles and seats, the extensive and picturesque lakes and waterfalls, and the lofty stupendous mountains, so little known, and so engaging to the imagination when described and exhibited in a lively manner: such a work would be well received.*

As I have seen no modern map of Scotland, I cannot pretend to say how accurate or particular any such may be; but this I know, that the best old maps of that kingdom are very defective. The great obvious defect that I have remarked in all maps of Scotland that have fallen in my way is, a want of a coloured line, or stroke that shall exactly define the just limits of that district called the highlands. Moreover, all the great avenues to that mountainous and romantic country want to be well distinguished. The military roads formed by General Wade are so great and Roman-like an undertaking that they will merit attention. My old map, Moll's map, takes notice of Fort William;† but could not mention the

* Few countries have been more thoroughly investigated than Ireland has been since White wrote; its lakes, rivers, and waterfalls have become familiar both to eye and ear. The superstitions, prejudices, and the wild notions of justice, of the people equally so. Let us add a hope that its improvements in the arts and agriculture will soon be equal to its opportunities.—Ed.

† Two ordnance surveys of Scotland have been executed since the days when Moll's map was an authority. One of them on a scale of six inches to the mile, the other one inch, besides many local surveys; but probably none of them give a coloured line or stroke defining the limits of highlands and lowlands. Its scenery is also familiar to every tourist, and still more so to every sportsman.—Ed.

other forts that have been erected long since: therefore a good representation of the chain of forts should not be omitted.

The celebrated zigzag up the Coryarich must not be passed over. Moll takes notice of Hamilton and Drumlanrig, and such capital houses; but a new survey, no doubt, should represent every seat and castle remarkable for any great event, or celebrated for its paintings, &c. Lord Breadalbane's seat and beautiful policy are too curious and extraordinary to be omitted.

The seat of the Earl of Eglintoun, near Glasgow, is worthy of notice. The pine-plantations of that nobleman are very grand and extensive indeed.

SELBORNE, *March* 9, 1775.

LETTER LXV.

TO THE HONOURABLE DAINES BARRINGTON.

ON September the 21st, 1741, being then on a visit, and intent on field-diversions, I rose before daybreak: when I came into the enclosures, I found the stubbles and clover-grounds matted all over with a thick coat of cobweb, in the meshes of which a copious and heavy dew hung so plentifully that the whole face of the country seemed, as it were, covered with two or three setting-nets drawn one over another. When the dogs attempted to hunt, their eyes were so blinded and hoodwinked that they could not proceed, but were obliged to lie down and scrape the incumbrances from their faces with their fore-feet, so that, finding my sport interrupted, I returned home musing in my mind on the oddness of the occurrence.

As the morning advanced the sun became bright and warm, and the day turned out one of those most lovely ones which no season but the autumn produces, cloudless, calm, serene, and worthy of the South of France itself.

About nine an appearance very unusual began to demand our attention, a shower of cobwebs falling from very elevated regions, and continuing, without

any interruption, till the close of the day. These webs were not single filmy threads, floating in the air in all directions, but perfect flakes or rags; some near an inch broad, and five or six long, which fell with a degree of velocity that showed they were considerably heavier than the atmosphere.

On every side as the observer turned his eyes might he behold a continual succession of fresh flakes falling into his sight, and twinkling like stars as they turned their sides towards the sun.

How far this wonderful shower extended, it would be difficult to say; but we know that it reached Bradley, Selborne, and Alresford, three places which lie in a sort of a triangle, the shortest of whose sides is about eight miles in extent.

At the second of those places there was a gentleman (for whose veracity and intelligent turn we have the greatest veneration) who observed it the moment he got abroad; but concluded that, as soon as he came upon the hill above his house, where he took his morning rides, he should be higher than this meteor, which he imagined might have been blown, like thistle-down, from the common above: but, to his great astonishment, when he rode to the most elevated part of the down, 300 feet above his fields, he found the webs in appearance still as much above him as before; still descending into sight in a constant succession, and twinkling in the sun, so as to draw the attention of the most incurious.

Neither before nor after was any such fall observed; but on this day the flakes hung in the trees and hedges so thick, that a diligent person sent out might have gathered baskets full.

The remark that I shall make on these cobweb-

like appearances, called gossamer, is, that, strange and superstitious as the notions about them were formerly, nobody in these days doubts but that they are the real production of small spiders, which swarm in the fields in fine weather in autumn, and have a power of shooting out webs from their tails so as to render themselves buoyant, and lighter than air. But why these apterous insects should that day take such a wonderful aërial excursion, and why their webs should at once become so gross and material as to be considerably more weighty than air, and to descend with precipitation, is a matter beyond my skill. If I might be allowed to hazard a supposition, I should imagine that those filmy threads, when first shot, might be entangled in the rising dew, and so drawn up, spiders and all, by a brisk evaporation into the regions where clouds are formed: and if the spiders have a power of coiling and thickening their webs in the air, as Dr. Lister says they have, then, when they were become heavier than the air, they must fall.*

Every day in fine weather, in autumn chiefly, do I see those spiders shooting out their webs and mounting aloft: they will go off from your finger if you will take them into your hand. Last summer one alighted on my book as I was reading in the parlour; and, running to the top of the page, and shooting out a web, took its departure from thence.

* One day when the air was full of such gossamers, Dr. Lister relates that he mounted to the highest part of York Cathedral and found the gossamer webs still far above him.

"Its sone some wonder at the cause of thunder,
On ebbe and flode, on gossamer and mist,
And on all things till that the cause is wist."

CHAUCER.

But what I most wondered at was, that it went off with considerable velocity, in a place where no air was stirring; and I am sure that I did not assist it with my breath. So that these little crawlers seem to have, while mounting, some locomotive power without the use of wings, and so move in the air faster than the air itself.

SELBORNE, *June* 8, 1775.

LETTER LXVI.

TO THE HONOURABLE DAINES BARRINGTON.

THERE is a wonderful spirit of sociality in the brute creation, independent of sexual attachment. Of this the congregating of gregarious birds in the winter is a remarkable instance.

Many horses, though quiet with company, will not stay one minute in a field by themselves: the strongest fences cannot restrain them. My neighbour's horse will not only not stay by himself abroad, but he will not bear to be left alone in a strange stable without discovering the utmost impatience, and endeavouring to break the rack and manger with his fore feet. He has been known to leap out at a stable-window, through which dung was thrown, after company; and yet in other respects is remarkably quiet. Oxen and cows will not fatten by themselves; but will neglect the finest pasture that is not recommended by society. It would be needless to add instances in sheep, which constantly flock together.

But this propensity seems not to be confined to animals of the same species; for we know a doe, still alive, that was brought up from a litte fawn

with a dairy of cows; with them it goes a-field, and with them it returns to the yard. The dogs of the house take no notice of this deer, being used to her; but, if strange dogs come by, a chase ensues; while the master smiles to see his favourite securely leading her pursuers over hedge, or gate, or stile, till she returns to the cows, who, with fierce lowings and menacing horns, drive the assailants quite out of the pasture.

Even great disparity of kind and size does not always prevent social advances and mutual fellowship. For a very intelligent and observant person has assured me that, in the former part of his life, keeping but one horse, he happened also on a time to have but one solitary hen. These two incongruous animals spent much of their time together in a lonely orchard, where they saw no creature but each other. By degrees an apparent regard began to take place between these two sequestered individuals. The fowl would approach the quadruped with notes of complacency, rubbing herself gently against his legs: while the horse would look down with satisfaction, and move with the greatest caution and circumspection, lest he should trample on his diminutive companion. Thus by mutual good offices, each seemed to console the vacant hours of the other: so that Milton, when he puts the following sentiment in the mouth of Adam, seems to be somewhat mistaken:—

> "Much less can bird with beast, or fish with fowl,
> So well converse, nor with the ox the ape."

SELBORNE, *Aug.* 15, 1775.

LETTER LXVII.

TO THE HONOURABLE DAINES BARRINGTON.

WE have two gangs or hordes of gypsies* which infest the south and west of England, and come round in their circuit two or three times in the year. One of these tribes calls itself by the noble name of Stanley, of which I have nothing particular to say; but the other is distinguished by an appellative somewhat remarkable—As far as their harsh gibberish can be understood, they seem to say that the name

* The gipsy families claim an antiquity to which that of the Stanleys is modern; philologists and physiologists alike assign a Sanscrit root to their language, and a Hindu type to their race. Two eminent writers have lately studied their language and habits, and thrown considerable light on both. Borrow has lived with them till he has acquired their tongue and been received as a brother. M. Esquiros, a French gentleman, one of the ablest writers in the "Revue des Deux Mondes," has also lived long enough with them to secure their confidence and give a popular description of their habits. From these two writers we gather that the gipsies, while faithful to their blood and their tribe, justify themselves in despoiling all the world besides; for ages their hand has been raised against every one, and every hand against them; and now the great obstacle to social reform among them is the tenacity with which they cling to the wandering life of their fathers. The progress of agriculture however, which has led to the enclosure of every available

of their clan is Curleople; now the termination of this word is apparently Grecian: and as Mezeray and the gravest historians all agree that these vagrants did certainly migrate from Egypt and the East, two or three centuries ago, and so spread by degrees over Europe, may not this family-name, a little corrupted, be the very name they brought with them from the Levant? It would be matter of some curiosity, could one meet with an intelligent person among them, to inquire whether, in their jargon, they still retain any Greek words: the Greek radicals will appear in hand, foot, head, water, earth, &c. It is possible that amidst their cant and corrupted dialect many mutilated remains of their native language might still be discovered.

nook of land, is operating powerfully upon these poor outcasts. They feel the pressure of the social laws severely, and from one extremity of the island to the other the complaint among them is that the "Romany" is disappearing. The feeling of brotherhood and love of the "blood" decline among them, and instances are not wanting of an improved social condition, to which philanthropy is giving every possible aid.

In 1832 an association was formed near Southampton, under the benevolent exertions of the Rev. George Crabb, who calls himself the "Gipsies' advocate." The results of his efforts show that there is hope of the gipsy consenting to live in towns and villages like other men. Many families avail themselves of the institution he has established, living in it during the winter, and permitting their children to attend its schools, while they resume their wandering life in summer. But those who have studied the subject will not be surprised to learn that it is only individuals who have availed themselves of the offered assistance. The gipsies, as a body, probably without knowing it themselves, have hitherto rigidly opposed themselves to the laws of social life, especially to a fixed domicile, the first proof of adhesion to those laws. It is possible that the exertions of Mr. Crabb's Society may be undermining these dogmas of their race. The Society have recently exerted themselves with some success in ameliorating the condition of the gipsies of Notting-dale near Kensington with considerable success.—ED.

With regard to those peculiar people, the gypsies, one thing is very remarkable, and especially as they came from warmer climates; and that is, that while other beggars lodge in barns, stables, and cow-houses, these sturdy savages seem to pride themselves in braving the severities of winter, and in living in the open air the whole year round. Last September was as wet a month as ever was known; and yet during those deluges did a young gypsy-girl lie-in in the midst of one of our hop-gardens, on the cold ground, with nothing over her but a piece of a blanket extended on a few hazel-rods bent hoop-fashion, and stuck into the earth at each end, in circumstances too trying for a cow in the same condition: yet within this garden there was a large hop-kiln, into the chambers of which she might have retired had she thought shelter an object worthy her attention.

Europe itself, it seems, cannot set bounds to the rovings of these vagabonds; for Mr. Bell, in his return from Pekin, met a gang of these people on the confines of Tartary, who were endeavouring to penetrate those deserts and try their fortune in China.*

Gypsies are called in French, Bohemians; in Italian and modern Greek, Zingari.

SELBORNE, *Oct.* 2, 1775.

* See Bell's "Travels in China."

LETTER LXVIII.

TO THE HONOURABLE DAINES BARRINGTON.

" Hîc - - - - tædæ pingues, hîc plurimus ignis
Semper, et assiduâ postes fuligine nigri."
(VIRG. *Ecl.* vii. 49, 50.)

" Here are fat torches, here abundant fire,
Here constant smoke has black'd each side the door."

I SHALL make no apology for troubling you with the detail of a very simple piece of domestic œconomy, being satisfied that you think nothing beneath your attention that tends to utility: the matter alluded to is the use of rushes instead of candles, which I am well aware prevails in many districts besides this; but as I know there are countries also where it does not obtain, and as I have considered the subject with some degree of exactness, I shall proceed in my humble story, and leave you to judge of the expediency.

The proper species of rush for this purpose seems to be the *juncus conglomeratus*, or common soft rush, which is to be found in most moist pastures, by the sides of streams, and under hedges. These rushes are in best condition in the height of summer; but may be gathered, so as to serve the purpose well,

quite on to autumn. It would be needless to add that the largest and longest are best. Decayed labourers, women, and children, make it their business to procure and prepare them. As soon as they are cut they must be flung into water, and kept there; for otherwise they will dry and shrink, and the peel will not run. At first a person would find it no easy matter to divest a rush of its peel or rind, so as to leave one regular, narrow, even rib from top to bottom that may support the pith: but this, like other feats, soon becomes familiar even to children; and we have seen an old woman, stone-blind, performing this business with great dispatch, and seldom failing to strip them with the nicest regularity. When these *junci* are thus far prepared, they must lie out on the grass to be bleached, and take the dew for some nights, and afterwards be dried in the sun.

Some address is required in dipping these rushes in the scalding fat or grease; but this knack also is to be attained by practice. The careful wife of an industrious Hampshire labourer obtains all her fat for nothing; for she saves the scummings of her bacon-pot for this use; and, if the grease abounds with salt, she causes the salt to precipitate to the bottom, by setting the scummings in a warm oven. Where hogs are not much in use, and especially by the sea-side, the coarser animal-oils will come very cheap. A pound of common grease may be procured for four pence; and about six pounds of grease will dip a pound of rushes; and one pound of rushes may be bought for one shilling; so that a pound of rushes, medicated and ready for use, will cost three shillings. If men that keep bees will mix a little wax with the grease, it will give it a consistency, and render it

more cleanly, and make the rushes burn longer; mutton-suet would have the same effect.

A good rush, which measured in length two feet four inches and a half, being minuted, burnt only three minutes short of an hour: and a rush still of greater length has been known to burn one hour and a quarter.

These rushes give a good clear light. Watch-lights (coated with tallow,) it is true, shed a dismal one, "darkness visible;" but then the wicks of those have two ribs of the rind, or peel, to support the pith, while the wick of the dipped rush has but one. The two ribs are intended to impede the progress of the flame and make the candle last.

In a pound of dry rushes, avoirdupois, which I caused to be weighed and numbered, we found upwards of one thousand six hundred individuals. Now suppose each of these burns, one with another, only half an hour, then a poor man will purchase eight hundred hours of light, a time exceeding thirty-three entire days, for three shillings. According to this account each rush, before dipping, costs $\frac{1}{33}$ of a farthing, and $\frac{1}{11}$ afterwards. Thus a poor family will enjoy $5\frac{1}{2}$ hours of comfortable light for a farthing. An experienced old house-keeper assures me that one pound and a half of rushes completely supplies his family the year round, since working people burn no candle in the long days, because they rise and go to bed by daylight.

Little farmers use rushes much, in the short days, both morning and evening, in the dairy and kitchen; but the very poor, who are always the worst œconomists, and therefore must continue very poor, buy a halfpenny candle every evening, which, in their

blowing open rooms, does not burn much more than two hours. Thus have they only two hours light for their money instead of eleven.

While on the subject of rural œconomy, it may not be improper to mention a pretty implement of housewifery that I have seen nowhere else; that is, little neat besoms which our foresters make from the stalk of the *polytricum commune*, or great golden maiden-hair, which they call silk-wood, and find plenty in the bogs. When this moss is well combed and dressed, and divested of its outer skin, it becomes of a beautiful bright chesnut colour; and, being soft and pliant, is very proper for the dusting of beds, curtains, carpets, hangings, &c. If these besoms were known to the brush-makers in town, it is probable they might come much more into use for the purpose above-mentioned.*

SELBORNE, *Nov.* 1, 1776.

* A besom of this sort is to be seen in Sir Ashton Lever's Museum.

LETTER LXIX.

TO THE HONOURABLE DAINES BARRINGTON.

WE had in this village more than twenty years ago an idiot-boy, whom I well remember, who, from a child, showed a strong propensity to bees; they were his food, his amusement, his sole object. And as people of this cast have seldom more than one point in view, so this lad exerted all his few faculties on this one pursuit. In the winter he dosed away his time, within his father's house, by the fire side, in a kind of torpid state, seldom departing from the chimney-corner; but in the summer he was all alert, and in quest of his game in the fields, and on sunny banks. Honey-bees, humble-bees, and wasps, were his prey wherever he found them: he had no apprehensions from their stings, but would seize them *nudis manibus*, and at once disarm them of their weapons, and suck their bodies for the sake of their honey-bags. Sometimes he would fill his bosom between his shirt and his skin with a number of these captives; and sometimes would confine them in bottles. He was a very *merops apiaster*, or bee-bird; and very injurious to men that kept bees: for he would slide

into their bee-gardens, and, sitting down before the stools, would rap with his finger on the hives, and so take the bees as they came out. He has been known to overturn hives for the sake of honey, of which he was passionately fond. Where metheglin was making he would linger round the tubs and vessels, begging a draught of what he called bee-wine. As he ran about he used to make a humming noise with his lips, resembling the buzzing of bees. This lad was lean and sallow, and of a cadaverous complexion; and, except in his favourite pursuit, in which he was wonderfully adroit, discovered no manner of understanding. Had his capacity been better, and directed to the same object, he had perhaps abated much of our wonder at the feats of a more modern exhibiter of bees; and we may justly say of him now,—

"— — — — — — — — — Thou,
Had thy presiding star propitious shone,
Should'st *Wildman* be — — — —."

When a tall youth he was removed from hence to a distant village, where he died, as I understand, before he arrived at manhood.

SELBORNE, *Dec.* 12, 1775.

LETTER LXX.

TO THE HONOURABLE DAINES BARRINGTON.

IT is the hardest thing in the world to shake off superstitious prejudices: they are sucked in as it were with our mother's milk; and, growing up with us at a time when they take the fastest hold and make the most lasting impressions, become so interwoven into our very constitutions, that the strongest good sense is required to disengage ourselves from them. No wonder therefore that the lower people retain them their whole lives through, since their minds are not invigorated by a liberal education, and therefore not enabled to make any efforts adequate to the occasion.

Such a preamble seems to be necessary before we enter on the superstitions of this district, lest we should be suspected of exaggeration in a recital of practices too gross for this enlightened age.

But the people of Tring, in Hertfordshire, would do well to remember, that no longer ago than the year 1751, and within twenty miles of the capital, they seized on two superannuated wretches, crazed with age, and overwhelmed with infirmities, on a

suspicion of witchcraft; and, by trying experiments, drowned them in a horse-pond.

In a farm-yard near the middle of this village stands, at this day, a row of pollard-ashes, which, by the seams and long cicatrices down their sides, manifestly show that, in former times, they have been cleft asunder. These trees, when young and flexible, were severed and held open by wedges, while ruptured children, stripped naked, were pushed through the apertures, under a persuasion that, by such a process, the poor babes would be cured of their infirmity. As soon as the operation was over, the tree, in the suffering part, was plastered with loam, and carefully swathed up. If the parts coalesced and soldered together, as usually fell out, where the feat was performed with any adroitness at all, the party was cured; but, where the cleft continued to gape, the operation, it was supposed, would prove ineffectual. Having occasion to enlarge my garden not long since, I cut down two or three such trees, one of which did not grow together.

We have several persons now living in the village, who, in their childhood, were supposed to be healed by this superstitious ceremony, derived down perhaps from our Saxon ancestors, who practised it before their conversion to Christianity.

At the south corner of the Plestor, or area, near the church, there stood, about twenty years ago, a very old grotesque hollow pollard-ash, which for ages had been looked on with no small veneration as a shrew-ash. Now a shrew-ash is an ash whose twigs or branches, when gently applied to the limbs of cattle, will immediately relieve the pains which a beast suffers from the running of a shrew-mouse over

the part affected: for it is supposed that a shrew-mouse is of so baneful and deleterious a nature, that wherever it creeps over a beast, be it horse, cow, or sheep, the suffering animal is afflicted with cruel anguish, and threatened with the loss of the use of the limb. Against this accident, to which they were continually liable, our provident fore-fathers always kept a shrew-ash at hand, which, when once medicated, would maintain its virtue for ever. A shrew-ash was made thus:*—Into the body of the tree a deep hole was bored with an auger, and a poor devoted shrew-mouse was thrust in alive, and plugged in, no doubt, with several quaint incantations long since forgotten. As the ceremonies necessary for such a consecration are no longer understood, all succession is at an end, and no such tree is known to subsist in the manor, or hundred.

As to that on the Plestor, for

"The late vicar stubb'd and burnt it,"

when he was way-warden, regardless of the remonstrances of the by-standers, who interceded in vain for its preservation, urging its power and efficacy, and alleging that it had been "guarded through many years by the piety of our ancestors;"

"Religione patrum multos servata per annos."

SELBORNE, *Jan.* 8, 1776.

* For a similar practice, White refers us to Plot's "Staffordshire."

LETTER LXXI.

TO THE HONOURABLE DAINES BARRINGTON.

IN heavy fogs, on elevated situations especially, trees are perfect alembics: and no one that has not attended to such matters can imagine how much water one tree will distil in a night's time, by condensing the vapour, which trickles down the twigs and boughs, so as to make the ground below quite in a float. In Newton-lane, in October, 1775, on a misty day, a particular oak in leaf dropped so fast that the cart-way stood in puddles and the ruts ran with water, though the ground in general was dusty.

In some of our smaller islands in the West-Indies, if I mistake not, there are no springs or rivers; but the people are supplied with that necessary element, water, merely by the dripping of some large tall trees, which, standing in the bosom of a mountain, keep their heads constantly enveloped with fogs and clouds, from which they dispense their kindly never-ceasing moisture; and so render those districts habitable by condensation alone.

Trees in leaf have such a vast proportion more of surface than those that are naked, that, in theory, their condensations should greatly exceed those that

are stripped of their leaves; but, as the former imbibe also a great quantity of moisture, it is difficult to say which drip most: but this I know, that deciduous trees that are entwined with much ivy seem to distil the greatest quantity. Ivy-leaves are smooth, and thick, and cold, and therefore condense very fast; and besides ever-greens imbibe very little. These facts may furnish the intelligent with hints concerning what sorts of trees they should plant round small ponds that they would wish to be perennial; and show them how advantageous some trees are in preference to others.

Trees perspire profusely, condense largely, and check evaporation so much, that woods are always moist: no wonder therefore that they contribute much to pools and streams.

That trees are great promoters of lakes and rivers appears from a well known fact in North America; for, since the woods and forests have been grubbed and cleared, all bodies of water are much diminished; so that some streams, that were very considerable a century ago, will not now drive a common mill.* Besides, most woodlands, forests, and chases, with us abound with pools and morasses; no doubt for the reason given above.

To a thinking mind few phenomena are more strange than the state of little ponds on the summits of chalk hills, many of which are never dry in the most trying droughts of summer. On chalk-hills I say, because in many rocky and gravelly soils springs usually break out pretty high on the sides of elevated grounds and mountains; but no person acquainted with chalky districts will allow that they ever saw

* *Vide* Kalm's Travels to North America.

springs in such a soil, but only in vallies and bottoms, since the waters of so pervious a stratum as chalk all lie on one dead level, as well-diggers have assured me again and again.

Now we have many such little round ponds in this district; and one in particular on our sheep-down, three hundred feet above my house; which, though never above three feet deep in the middle, and not more than thirty feet in diameter, and containing perhaps not more than two or three hundred hogsheads of water, yet never is it known to fail, though it affords drink for three hundred or four hundred sheep, and for at least twenty head of large cattle beside. This pond, it is true, is over-hung with two moderate-sized beeches, that, doubtless, at times afford it much supply: but then we have others as small, that, without the aid of trees, and in spite of evaporation from sun and wind, and perpetual consumption by cattle, yet constantly maintain a moderate share of water, without overflowing in the wettest seasons, as they would do if supplied by springs. By my journal of May 1775, it appears that "the small and even considerable ponds in the vales are now dried up, while the small ponds on the very tops of hills are but little affected." Can this difference be accounted for from evaporation alone, which certainly is more prevalent in bottoms? or rather have not those elevated pools some unnoticed recruits, which in the night time counterbalance the waste of the day; without which the cattle alone must soon exhaust them? And here it will be necessary to enter more minutely into the cause. Dr. Hales, in his Vegetable Statics, advances, from experiment, that "the moister the earth is the more

dew falls on it in a night: and more than a double quantity of dew falls on a surface of water than there does on an equal surface of moist earth."* Hence we see that water, by its coolness, is enabled to assimilate to itself a large quantity of moisture nightly by condensation; and that the air, when loaded with fogs and vapours, and even with copious dews, can alone advance a considerable and never-failing resource. Persons that are much abroad, and travel early and late; such as shepherds, fishermen, &c. can tell what prodigious fogs prevail in the night on elevated downs, even in the hottest parts of summer; and how much the surfaces of things are drenched by those swimming vapours, though, to the senses, all the while, little moisture seems to fall.

SELBORNE, *Feb.* 7, 1776.

* While the experiments of Dr. Hales are able contributions to science, his inferences are out of date. The true theory of dew is now better understood. It is an exhalation rising *from* the earth, and does not *fall*. "In fine, calm weather," says Professor Leslie, "after the rays of the declining sun have ceased to warm the surface of the ground, the descent of the higher mass of air gradually chills the lower stratum and disposes it to dampness, till their continued intermixture produces a fog or low cloud. These minute suspended aqueous globules attaching themselves to the projecting points of the herbage, form dew in mild weather, or shoot into hoar frost when cold predominates." The vapour thus formed coming in contact with any object a few degrees colder than itself is condensed and becomes the dew on the grass. For, as the Scottish poet has it,—

"Ilka blade of grass keps its ain drap o' dew."

ED.

LETTER LXXII.

TO THE HONOURABLE DAINES BARRINGTON.

MONSIEUR HERISSANT, a French anatomist, seems persuaded that he has discovered the reason why cuckoos do not hatch their own eggs; the impediment, he supposes, arises from the internal structure of their parts, which incapacitates them for incubation. According to this gentleman, the crop, or craw, of a cuckoo does not lie before the sternum at the bottom of the neck, as in the poultry, *gallinæ*, and pigeons, *columbæ*, &c. but immediately behind it, on and over the bowels, so as to make a large protuberance in the belly.*

Induced by this assertion, we procured a cuckoo; and, cutting open the breast-bone, and exposing the intestines to sight, found the crop lying as mentioned above. This stomach was large and round,†

* Histoire de l'Académie Royale, 1752.

† "So large," says M'Gillivray, "that when distended it almost fills the anterior or lower part of the abdomen, with the walls of which it is in contact. But in the owl's and goat-sucker's it is equally large, and similarly situated; and of course it does not prevent incubation with them." It is a curious fact, related by M'Gillivray, that on the cuckoo's first

and stuffed hard like a pincushion with food, which, upon nice examination, we found to consist of various insects; such as small scarabs, spiders, and dragon flies; the last of which we have seen cuckoos catching on the wing as they were just emerging out of the aurelia state. Among this farrago also were to be seen maggots, and many seeds, which belonged either to gooseberries, currants, cranberries, or some such fruit; so that these birds apparently subsist on insects and fruits: nor was there the least appearance of bones, feathers, or fur to support the idle notion of their being birds of prey.

The sternum in this bird seemed to us to be remarkably short, between which and the anus lay the crop, or craw; and immediately behind that the bowels against the back-bone.

It must be allowed, as this anatomist observes, that the crop placed just upon the bowels must, especially when full, be in a very uneasy situation during the business of incubation; yet the test will be to examine whether birds that are actually known to sit for certain are not formed in a similar manner. This inquiry I proposed to myself to make with a fern-owl, or goat-sucker, as soon as opportunity offered: because, if their formation proves the same, the reason for incapacity in the cuckoo will be allowed to have been taken up somewhat hastily.

Not long after a fern-owl was procured, which,

arrival its food consists of coleopterous and other insects; some time afterwards it lives chiefly on hairy caterpillars, and the inner membrane of the gizzard is completely covered with their hairs so as to resemble the pile of some quadrupeds, arranged in a circular order, as if the food moved in a rotatory manner. Mr. White seems to be the only naturalist who found seeds in the stomach.—Ed.

from its habit and shape, we suspected might resemble the cuckoo in its internal construction. Nor were our suspicions ill-grounded; for, upon the dissection, the crop, or craw, also lay behind the sternum, immediately on the viscera, between them and the skin of the belly. It was bulky, and stuffed hard with large *phalænæ*, moths of several sorts, and their eggs, which no doubt had been forced out of those insects by the action of swallowing.

Now as it appears that this bird, which is so well known to practise incubation, is formed in a similar manner with cuckoos, Monsieur Herissant's conjecture, that cuckoos are incapable of incubation from the disposition of their intestines, seems to fall to the ground: and we are still at a loss for the cause of that strange and singular peculiarity in the instance of the *cuculus canorus*.*

We found the case to be the same with the ring-tail hawk, in respect to formation; and, as far as I can recollect, with the swift; and probably it is so with many more sorts of birds that are not granivorous.

SELBORNE, *April* 3, 1776.

* The Cuckoo, Professor Owen tells us, has no true crop; nor do the proventricules differ from those of other scansorial birds which incubate.—ED.

LETTER LXXIII.

TO THE HONOURABLE DAINES BARRINGTON.

ON August the 4th, 1775, we surprised a large viper, which seemed very heavy and bloated, as it lay in the grass basking in the sun. When we came to cut it up, we found that the abdomen was crowded with young, fifteen in number; the shortest of which measured full seven inches, and were about the size of full-grown earth-worms. This little fry issued into the world with the true viper spirit about them, showing great alertness as soon as disengaged from the belly of the dam:* they twisted and wriggled

* The Viper, (*Pelias berus*, Bell,) is fortunately the only venomous snake indigenous to our island; it is by no means uncommon either in England or Scotland; but Ireland (blessed be St. Patrick) is entirely free from them. The fluid seems to be perfectly innocuous when swallowed, and only dangerous when introduced into the system. The Viper is ova-viviparous, and in the act of parturition the membrane of the egg is burst, for until the moment of exclusion the membrane with which the young are covered is entire, but so thin as to be torn by the slightest touch.

The teeth charged with the poison are hollow tubes, one on each side of the mouth, and attached to a small moveable bone, articulated to the maxillary bone. When at rest it reclines on the margin of the part, and is covered by the fold of skin here alluded to. When in action the tooth is raised by means of a small muscle, and stands erect upon the jaw

about, and set themselves up, and gaped very wide when touched with a stick, showing manifest tokens of menace and defiance, though as yet they had no manner of fangs that we could find, even with the help of our glasses.

To a thinking mind nothing is more wonderful than that early instinct which impresses young animals with the notion of the situation of their natural weapons, and of using them properly in their own defence, even before those weapons subsist or are formed. Thus a young cock will spar at his adversary before his spurs are grown; and a calf or a lamb will push with their heads before their horns are sprouted. In the same manner did these young adders attempt to bite before their fangs were in being. The dam however was furnished with very formidable ones, which we lifted up (for they fold down when not used) and cut them off with the point of our scissors.

There was little room to suppose that this brood had ever been in the open air before; and that they were taken in for refuge, at the mouth of the dam, when she perceived that danger was approaching; because then probably we should have found them somewhere in the neck, and not in the abdomen.

SELBORNE, *April* 29, 1776.

bone; and when a wound is inflicted a small drop of the poison is forced by the pressure through the perforation into the wound. When the bite is repeated immediately, and before the creature has time to recover its powers, the poison becomes less effective. It does not bite and run, but stands boldly on the defensive. Mr. Broderip mentions an instance where one bit two dogs in succession, and still showed a bold front to the sportsman, until he dropped a large stone upon it, when it decamped. The first dog was severely bitten, the second less so.—ED.

LETTER LXXIV.

TO THE HONOURABLE DAINES BARRINGTON.

CASTRATION has a strange effect: it emasculates both man, beast, and bird, and brings them to a near resemblance of the other sex. Thus eunuchs have smooth unmuscular arms, thighs, and legs; and broad hips, and beardless chins, and squeaking voices. Gelt-stags and bucks have hornless heads, like hinds and does. Thus wethers have small horns, like ewes; and oxen large bent horns, and hoarse voices when they low, like cows: for bulls have short straight horns; and though they mutter and grumble in a deep tremendous tone, yet they low in a shrill high key. Capons have small combs and gills, and look pallid about the head, like pullets; they also walk without any parade, and hover over chickens like hens.* Barrow-hogs have also small tusks like sows.

Thus far it is plain that the deprivation of masculine vigour puts a stop to the growth of those parts

* Reaumur, Mr. Rennie tells us, trained capons to nurse the chickens he hatched by artificial heat. They clucked like hens and proved good nurses.

or appendages that are looked upon as its insignia. But the ingenious Mr. Lisle, in his book on husbandry, carries it much farther; for he says that the loss of those insignia alone has sometimes a strange effect on the ability itself: he had a boar so fierce and venereous, that to prevent mischief, orders were given for his tusks to be broken off. No sooner had the beast suffered this injury than his powers forsook him, and he neglected those females to whom before he was passionately attached, and from whom no fences could restrain him.

LETTER LXXV.

TO THE HONOURABLE DAINES BARRINGTON.

THE natural term of an hog's life is little known, and the reason is plain—because it is neither profitable nor convenient to keep that turbulent animal to the full extent of its time: however, my neighbour, a man of substance, who had no occasion to study every little advantage to a nicety, kept an half-bred Bantam-sow, who was as thick as she was long, and whose belly swept on the ground till she was advanced to her seventeenth year, at which period she showed some tokens of age by the decay of her teeth and the decline of her fertility.

For about ten years this prolific mother produced two litters in the year of about ten at a time, and once above twenty at a litter; but, as there were near double the number of pigs to that of teats, many died. From long experience in the world this female was grown very sagacious and artful;—when she found occasion to converse with a boar she used to open all the intervening gates, and march, by herself, up to a distant farm where one was kept; and when her purpose was served would return by the same means. At the age of about fifteen her

litters began to be reduced to four or five; and such a litter she exhibited when in her fatting-pen. She proved, when fat, good bacon, juicy, and tender; the rind, or sward, was remarkably thin. At a moderate computation she was allowed to have been the fruitful parent of three hundred pigs: a prodigious instance of fecundity in so large a quadruped! She was killed in spring 1775.

LETTER LXXVI.

TO THE HONOURABLE DAINES BARRINGTON.

"— — — — — — admorunt ubera tigres."

"By tigers suckled."

WE have remarked in a former letter how much incongruous animals, in a lonely state, may be attached to each other from a spirit of sociality; in this it may not be amiss to recount a different motive which has been known to create as strange a fondness.

My friend had a little helpless leveret brought to him, which the servants fed with milk in a spoon, and about the same time his cat kittened and the young were despatched and buried. The hare was soon lost, and supposed to be gone the way of most fondlings, to be killed by some dog or cat. However, in about a fortnight, as the master was sitting in his garden in the dusk of the evening, he observed his cat, with tail erect, trotting towards him, and calling with little short inward notes of complacency, such as they use towards their kittens, and something gamboling after, which proved to be the leveret that the cat had supported with her milk, and continued to support with great affection.

Thus was a graminivorous animal nurtured by a carnivorous and predaceous one!

Why so cruel and sanguinary a beast as a cat, of the ferocious genus of *Feles*, the *murium leo*, as Linnæus calls it, should be affected with any tenderness towards an animal which is its natural prey, is not so easy to determine.

This strange affection probably was occasioned by that desiderium, those tender maternal feelings, which the loss of her kittens had awakened in her breast; and by the complacency and ease she derived to herself from the procuring her teats to be drawn, which were too much distended with milk, till, from habit, she became as much delighted with this fondling as if it had been her real offspring.*

This incident is no bad solution of that strange circumstance which grave historians as well as the poets assert, of exposed children being sometimes nurtured by female wild beasts that probably had lost their young. For it is not one whit more marvellous that Romulus and Remus, in their infant state, should be nursed by a she wolf, than that a poor little sucking leveret should be fostered and cherished by a bloody grimalkin.

"— — — — viridi fœtam Mavortis in antro
Procubuisse lupam: geminos huic ubera circum
Ludere pendentes pueros, et lambere matrem
Impavidos; illam tereti cervice reflexam
Mulcere alternos, et corpora fingere linguâ."
(VIRG. *Æn.* viii. 630-634.)

Or, as Christopher Pitt renders the Roman poet:—

* Many readers will remember the itinerant's truck which perambulated the metropolis some years ago, and perhaps does so still, where the rat, the cat, the hawk, the pigeon, and many other equally strange companions, lived in harmony, the law of kindness serving to set aside what is usually considered the first law of Nature, antagonism.—ED.

"Here in a verdant cave's embowering shade,
The fostering wolf and martial twins were laid:
The indulgent mother, half reclined along,
Look'd fondly back, and formed them with her tongue."

[Again a boy has taken three little squirrels in their nest, or drey as it is called in these parts. These small creatures he put under the care of a cat who had lately lost her kittens, and finds that she nurses and suckles them with the same assiduity and affection, as if they were her own offspring.

So many people went to see the little squirrels suckled by a cat, that the foster mother became jealous of her charge, and in pain for their safety; and therefore hid them over the ceiling, where one died. This circumstance shows her affection for these fondlings, and that she supposes the squirrels to be her own young. Thus hens, when they have hatched ducklings, are equally attached to them as if they were her own chickens.]—OBSERVATIONS ON NATURE.

SELBORNE, *May* 9, 1776.

LETTER LXXVII.

TO THE HONOURABLE DAINES BARRINGTON.

LANDS that are subject to frequent inundations are always poor; and probably the reason may be because the worms are drowned. The most insignificant insects and reptiles are of much more consequence, and have much more influence in the œconomy of Nature, than the incurious are aware of; and are mighty in their effect, from their minuteness, which renders them less an object of attention; and from their numbers and fecundity. Earth-worms, though in appearance a small and despicable link in the chain of Nature, yet, if lost, would make a lamentable chasm. For, to say nothing of half the birds, and some quadrupeds which are almost entirely supported by them, worms seem to be great promoters of vegetation, which would proceed but lamely without them; by boring, perforating, and loosening the soil, and rendering it pervious to rains and the fibres of plants; by drawing straws and stalks of leaves and twigs into it; and, most of all, by throwing up such infinite numbers of lumps of earth called worm-casts, which, being their excrement, is a fine

manure for grain and grass. Worms probably provide new soil for hills, and slopes, where the rain washes the earth away; and they affect slopes, probably to avoid being flooded. Gardeners and farmers express their detestation of worms; the former because they render their walks unsightly, and make them much work: and the latter because, as they think, worms eat their green corn. But these men would find that the earth without worms would soon become cold, hard-bound, and void of fermentation; and consequently sterile: and besides, in favour of worms, it should be hinted that green corn, plants, and flowers, are not so much injured by them as by many species of *coleoptera* (scarabs), and *tipulæ* (long-legs), in their larva, or grub-state; and by unnoticed myriads of small shell-less snails, called slugs, which silently and imperceptibly make amazing havock in the field and garden.

Farmer Young, of Norton-farm, says that this spring (1777) about four acres of his wheat in one field was entirely destroyed by slugs, which swarmed on the blades of corn, and devoured it as it sprang.

These hints we think proper to throw out in order to set the inquisitive and discerning to work.

A good monography of worms would afford much entertainment and information at the same time, and would open a large and new field in natural history. Worms work most in the spring; but by no means lie torpid in the dead months; they are out every mild night in the winter, as any person may satisfy himself. They are hermaphrodites, and are, consequently, very prolific.

SELBORNE, *May* 20, 1777.

LETTER LXXVIII.

TO THE HONOURABLE DAINES BARRINGTON.

YOU cannot but remember that the twenty-sixth and twenty-seventh of last March were very hot days; so sultry that every body complained and were restless under those sensations to which they had not been reconciled by gradual approaches.

This sudden summer-like heat was attended by many summer coincidences; for on those two days the thermometer rose to sixty-six in the shade; many species of insects revived and came forth; some bees swarmed in this neighbourhood; the old tortoise, near Lewes in Sussex, awakened and came forth out of its dormitory; and, what is most to my present purpose, many house-swallows appeared and were very alert in many places, and particularly at Cobham, in Surrey.

But as that short warm period was succeeded as well as preceded by harsh severe weather, with frequent frosts and ice, and cutting winds, the insects withdrew, the tortoise retired again into the ground, and the swallows were seen no more until the tenth of April, when, the rigour of the spring abating, a softer season began to prevail.

Again; it appears by my journals for many years past, that house-martins retire, to a bird, about the beginning of October; so that a person very observant of such matters would conclude that they had taken their last farewell: but then it may be seen in my diaries also that considerable flocks have discovered themselves again in the first week of November, and often on the fourth day of that month only for one day; and that not as if they were in actual migration, but playing about at their leisure and feeding calmly, as if no enterprize of moment at all agitated their spirits. And this was the case in the beginning of this very month; for, on the fourth of November, more than twenty house-martins, which, in appearance, had all departed about the seventh of October, were seen again, for that one morning only, sporting between my fields and the Hanger, and feasting on insects which swarmed in that sheltered district. The preceding day was wet and blustering, but the fourth was dark and mild, and soft, the wind at south-west, and the thermometer at 58½°; a pitch not common at that season of the year. Moreover, it may not be amiss to add in this place, that whenever the thermometer is above 50° the bat comes flitting out in every autumnal and winter-month.

From all these circumstances laid together, it is obvious that torpid insects, reptiles, and quadrupeds, are awakened from their profoundest slumbers by a little untimely warmth; and therefore that nothing so much promotes this death-like stupor as a defect of heat. And farther, it is reasonable to suppose that two whole species, or at least many individuals of those two species, of British *hirundines*, do never

leave this island at all, but partake of the same benumbed state: for we cannot suppose that, after a month's absence, house-martins can return from southern regions to appear for one morning in November, or that house-swallows should leave the districts of Africa to enjoy, in March, the transient summer of a couple of days.*

SELBORNE, *Nov.* 22, 1777.

* The fact of swallows migrating is undisputed, and none have borne more direct testimony to the fact than our author. This would hardly be the case if they were capable of hybernation; indeed, if their instincts led swallows to this manner of escaping from the severity of winter, it would be universal with them, and not be confined to a few individuals. Mr. Rennie thinks it is more probable that the individuals appearing in November are late broods from the north, and those seen in March early stragglers going northwards.—ED.

LETTER LXXIX.

TO THE HONOURABLE DAINES BARRINGTON.

THERE was in this village several years ago a miserable pauper, who, from his birth, was afflicted with a leprosy, as far as we are aware, of a singular kind; since it affected only the palms of his hands and the soles of his feet. This scaly eruption usually broke out twice in the year, at the spring and fall; and, by peeling away, left the skin so thin and tender that neither his hands nor feet were able to perform their functions; so that the poor object was half his time on crutches, incapable of employ, and languishing in a tiresome state of indolence and inactivity. His habit was lean, lank, and cadaverous. In this sad plight he dragged on a miserable existence, a burden to himself and his parish, which was obliged to support him till he was relieved by death at more than thirty years of age.

The good women, who love to account for every defect in children by the doctrine of longing, said that his mother felt a violent propensity for oysters, which she was unable to gratify; and that the black rough scurf on his hands and feet were the shells of

that fish. I knew his parents, neither of which were lepers; his father in particular lived to be far advanced in years.

In all ages, the leprosy has made dreadful havoc among mankind. The Israelites seem to have been greatly afflicted with it from the most remote times; as appears from the peculiar and repeated injunctions given them in the Levitical law.* Nor was the rancour of this foul disorder much abated in the last period of their commonwealth, as may be seen in many passages of the New Testament.

Some centuries ago this horrible distemper prevailed all Europe over; and our forefathers were by no means exempt, as appears by the large provisions made for objects labouring under this calamity. There was a hospital for female lepers in the diocese of Lincoln, a noble one near Durham, three in London and Southwark, and perhaps many more in or near our great towns and cities. Moreover, some crowned heads, and other wealthy and charitable personages, bequeathed large legacies to such poor people as languished under this hopeless infirmity.

It must therefore, in these days, be, to a humane and thinking person, a matter of equal wonder and satisfaction, when he contemplates how nearly this pest is eradicated, and observes that a leper now is a rare sight. He will, moreover, when engaged in such a train of thought, naturally inquire for the reason. This happy change perhaps may have originated and been continued from the much smaller quantity of salted meat and fish now eaten in these kingdoms; from the use of linen next the skin;

* See Leviticus, chaps. xiii. and xiv.

from the plenty of better bread; and from the profusion of fruits, roots, legumes, and greens, so common now in every family. Three or four centuries ago, before there were any enclosures, sown-grasses, field-turnips, or field-carrots, or hay, all the cattle which had grown fat in summer, and were not killed for winter-use, were turned out soon after Michaelmas to shift as they could through the dead months; so that no fresh meat could be had in winter or spring. Hence the marvellous account of the vast stores of salted flesh found in the larder of the eldest Spencer, viz. six hundred bacons, eighty carcases of beef, and six hundred muttons, in the days of Edward the Second, even so late in the spring as the third of May. It was from magazines like these that the turbulent barons supported in idleness their riotous swarms of retainers ready for any disorder or mischief. But agriculture is now arrived at such a pitch of perfection, that our best and fattest meats are killed in the winter; and no man need eat salted flesh, unless he prefers it.

One cause of this distemper might be, no doubt, the quantity of wretched fresh and salt fish consumed by the commonalty at all seasons as well as in Lent; which our poor now would hardly be persuaded to touch.

The use of linen changes, shirts or shifts, in the room of sordid and filthy woollen, long worn next the skin, is a matter of neatness comparatively modern; but must prove a great means of preventing cutaneous ails. At this very time woollen instead of linen prevails among the poorer Welsh, who are subject to foul eruptions.

The plenty of good wheaten bread that now is

found among all ranks of people in the south, instead of that miserable sort which used in old days to be made of barley or beans, may contribute not a little to the sweetening their blood and correcting their juices; for the inhabitants of mountainous districts, to this day are still liable to the itch and other cutaneous disorders, from poverty of diet.

As to the produce of a garden, every middle-aged person of observation may perceive, within his own memory, both in town and country, how vastly the consumption of vegetables is increased. Greenstalls in cities now support multitudes in a comfortable state, while gardeners get fortunes. Every decent labourer also has his garden, which is half his support, as well as his delight; and common farmers provide plenty of beans, peas, and greens, for their hinds to eat with their bacon; and those few that do not are despised for their sordid parsimony, and looked upon as regardless of the welfare of their dependants. Potatoes have prevailed in this little district, by means of premiums, within these twenty years only; and are much esteemed here now by the poor, who would scarce have ventured to taste them in the last reign.

Our Saxon ancestors certainly had some sort of cabbage, because they call the month of February sprout-cale;* but, long after their days, the cultivation of gardens was little attended to. The religious, being men of leisure, and keeping up a constant correspondence with Italy, were the first people among

* March was the stormy month with our Saxon ancestors; May, Thromilchi, the cows being then milked three times a-day; June, dig and weed month; September, barley month.—MITFORD.

us that had gardens and fruit-trees in any perfection, within the walls of their abbies, priories, and monasteries, where the lamp of knowledge continued to burn, however dimly. In them men of business were formed for the state: the art of writing was cultivated by the monks; they were the only proficients in mechanics, gardening, and architecture.* The barons neglected every pursuit that did not lead to war or tend to the pleasure of the chase.

It was not till gentlemen took up the study of horticulture themselves that the knowledge of gardening made such hasty advances. Lord Cobham, Lord Ila, and Mr. Waller of Beaconsfield, were some of the first people of rank that promoted the elegant science of ornamenting without despising the superintendence of the kitchen quarters and fruit walls.

A remark made by the excellent Mr. Ray in his Tour of Europe at once surprises us, and corroborates what has been advanced above; for we find him observing, so late as his days, that "the Italians use several herbs for sallets, which are not yet or have not been but lately used in England, viz. *selleri* (celery) which is nothing else but the sweet smallage; the young shoots whereof, with a little of the head of the root cut off, they eat raw with oil and pepper." And farther he adds, "curled endive blanched is much used beyond seas; and, for a raw sallet, seemed to excel lettuce itself." Now this journey was undertaken no longer ago than in the year 1663.

SELBORNE, *Jan.* 8, 1778.

* Dalrymple's Annals of Scotland.

LETTER LXXX.

TO THE HONOURABLE DAINES BARRINGTON.

"Fortè puer, comitum seductus ab agmine fido,
Dixerat, Ecquis adest? et, Adest, responderat Echo.
Hic stupet; utque aciem partes divisit in omnes;
Voce, Veni, clamat magnâ. Vocat illa vocantem."
(OVID, *Met.* iii. 379.)

"The youth being separated by chance from his faithful attendants, calls aloud, 'Is there any one here?' and echo answers, 'Here.' He is amazed, he casts his eyes on every side and calls with a loud voice, 'Come!' whereupon echo calls the youth, who calls."

"She can't begin, but waits for the rebound,
To catch his voice and then return the sound."
(DRYDEN.)

IN a district so diversified as this, so full of hollow vales and hanging woods, it is no wonder that echoes should abound. Many we have discovered that return the cry of a pack of dogs, the notes of a hunting-horn, a tunable ring of bells, or the melody of birds, very agreeably: but we were still at a loss for a poly-syllabical, articulate echo, till a young gentleman, who had parted from his company in a summer evening walk, and was calling after them, stumbled upon a very curious one in a spot where it might least be expected. At first he was much surprised,

and could not be persuaded but that he was mocked by some boy; but, repeating his trials in several languages, and finding his respondent to be a very adroit polyglot, he then discerned the deception.

This echo in an evening, before rural noises cease, would repeat ten syllables most articulately and distinctly, especially if quick dactyls were chosen. The last syllables of

"Tityre, tu patulæ recubans — — — "*

were as audibly and intelligibly returned as the first; and there is no doubt, could trial have been made, but that at midnight, when the air is very elastic, and a dead stillness prevails, one or two syllables more might have been obtained; but the distance rendered so late an experiment very inconvenient.

Quick dactyls, we observed, succeeded best; for when we came to try its powers in slow, heavy, embarrassed spondees of the same number of syllables,

"Monstrum horrendum, informe, ingens. — — "†

we could perceive a return but of four or five.

All echoes have some one place to which they are returned stronger and more distinct than to any other; and that is always the place that lies at right angles with the object of repercussion, and is not too near, nor too far off. Buildings, or naked rocks, re-echo much more articulately than hanging wood or vales; because in the latter the voice is as it were entangled, and embarrassed in the covert, and weakened in the rebound.

* "Beneath the shade which beechen boughs diffuse
You, Tityrus, entertain your sylvan muse."
(DRYDEN's *Virg. Ecl.* i. 1.)

† "A monster grim, tremendous, vast and high".
(*Ibid. Æn.* iii. 658.)

The true source of this echo, as we found by various experiments, is the stone-built, tiled hop-kiln in Gally-lane, which measures in front 40 feet, and from the ground to the eaves 12 feet. The true *centrum phonicum*, or just distance, is one particular spot in the Kings'-field, in the path to Nore-hill, on the very brink of the steep balk above the hollow cart way. In this case there is no choice of distance; but the path, by mere contingency, happens to be the lucky, the identical spot, because the ground rises or falls so immediately, if the speaker either retires or advances, that his mouth would at once be above or below the object.

We measured this polysyllabical echo with great exactness, and found the distance to fall very short of Dr. Plot's rule for distinct articulation: for the Doctor, in his history of Oxfordshire, allows 120 feet for the return of each syllable distinctly: hence this echo, which gives ten distinct syllables, ought to measure 400 yards, or 120 feet, to each syllable; whereas our distance is only 258 yards, or near 75 feet, to each syllable. Thus our measure falls short of the Doctor's, as five to eight: but then it must be acknowledged that this candid philosopher was convinced afterwards, that some latitude must be admitted of in the distance of echoes according to time and place.

When experiments of this sort are making, it should always be remembered that weather and the time of day have a vast influence on an echo; for a dull, heavy, moist air deadens and clogs the sound; and hot sunshine renders the air thin and weak, and deprives it of all its springiness; and a ruffling wind

quite defeats the whole. In a still, clear, dewy evening the air is most elastic; and perhaps the later the hour the more so. Echo has always been so amusing to the imagination, that the poets have personified her; and in their hands she has been the occasion of many a beautiful fiction. Nor need the gravest man be ashamed to appear taken with such a phænomenon, since it may become the subject of philosophical or mathematical inquiries.

One should have imagined that echoes, if not entertaining, must at least have been harmless and inoffensive; yet Virgil advances a strange notion, that they are injurious to bees. After enumerating some probable and reasonable annoyances, such as prudent owners would wish far removed from their bee-gardens, he adds

"— — — — — — — aut ubi concava pulsu
Saxa sonant, vocisque offensa resultat imago." *

[There is a natural occurrence to be met with upon the highest part of our downs in hot summer days, which always amuses me much, without giving me any satisfaction with respect to the cause of it; and that is a loud audible humming as of bees in the air, † though not one insect is to be seen. This sound is to be heard distinctly the whole common through, from the Money-dells,† to my avenue gate.

* "Nor place them where too deep a water flows,
Or where the yew, their poisonous neighbour, grows
Nor near the steaming stench of muddy ground,
Nor hollow rocks that render back the sound,
And double images of voice rebound."
(DRYDEN'S *Virg. Georg.* iv. 47-50.)

† Bees high in the air, or clouds of minute insects in a similar position, it has been suggested, may cause this mysterious humming, which will be familiar to all who have taken to the high grounds in a calm summer's day.—ED.

Any person would suppose that a large swarm of bees was in motion, and playing about over his head. This noise was heard last week, on June 28th.

> "Resounds the living surface of the ground,
> Nor undelightful is the ceaseless hum
> To him who muses * * * * at noon."
> "Thick in yon stream of light a thousand ways,
> Upward and downward, thwarting and convolv'd,
> The quivering nations sport."

This wild and fanciful assertion will hardly be admitted by the philosophers of these days; especially as they all now seem agreed that insects are not furnished with any organs of hearing at all.* But if it should be urged, that though they cannot hear yet perhaps they may feel the repercussion of sounds, I grant it is possible they may. Yet that these impressions are distasteful or hurtful, I deny, because bees, in good summers, thrive well in my outlet, where the echoes are very strong: for this village is another Anathoth, a place of responses or echoes. Besides, it does not appear from experiment that bees are in any way capable of being affected by sounds:† for I have often tried my own with a large speaking-trumpet held close to their hives, and with

* Brunelle's experiment set this strange conclusion at rest. He kept several males of the large grasshopper in a closet. A tap at the door of this closet at once intercepted their chirping, and produced silence. He also learned to imitate, and they immediately answered him. Other variations of the experiment quite satisfied him that the male and female heard and responded to each other.—ED.

† The popular custom of "ringing" bees by striking the door-key on a frying-pan affords no proof that bees are affected by sounds. Though the country people now believe that the sound induces the swarm to settle, the original object of the custom was that the neighbours should have notice that the swarm was private property. Otherwise, it might be hived by any one in whose garden it had settled.—ED.

such an exertion of voice as would have hailed a ship at the distance of a mile, and still these insects pursued their various employments undisturbed, and without showing the least insensibility or resentment.

Some time since its discovery this echo is become totally silent, though the object, or hop-kiln, remains: nor is there any mystery in this defect; for the field between is planted as an hop-garden, and the voice of the speaker is totally absorbed and lost among the poles and entangled foliage of the hops. And when the poles are removed in autumn the disappointment is the same; because a tall quick-set hedge, nurtured up for the purpose of shelter to the hop ground, interrupts the repercussion of the voice: so that till those obstructions are removed no more of its garrulity can be expected.

Should any gentleman of fortune think an echo in his park or outlet a pleasing incident, he might build one at little or no expense. For whenever he had occasion for a new barn, stable, dog-kennel, or the like structure, it would be only needful to erect this building on the gentle declivity of an hill, with a like rising opposite to it, at a few hundred yards distance; and perhaps success might be the easier ensured could some canal, lake, or stream, intervene. From a seat at the *centrum phonicum* he and his friends might amuse themselves sometimes of an evening with the prattle of this loquacious nymph; of whose complacency and decent reserve more may be said than can with truth of every individual of her sex; since she is "always ready with her vocal response, but never intrusive:"—

"— — — — — — — quæ nec reticere loquenti,
Nec prior ipsa loqui didicit resonabilis echo."

The classic reader will, I trust, pardon the following lovely quotation, so finely describing echoes, and so poetically accounting for their causes:—

" Quæ benè quom videas, rationem reddere possis
Tute tibi atque aliis, quo pacto per loca sola
Saxa pareis formas verborum ex ordine reddant,
Palanteis comites quom monteis inter opacos
Quærimus, et magnâ dispersos voce ciemus.
Sex etiam, aut septem loca vidi reddere voces
Unam quom jaceres: ita colles collibus ipsis
Verba repulsantes iterabant dicta referre.
Hæc loca capripedes Satyros, Nymphasque tenere
Finitimi fingunt, et Faunos esse loquuntur;
Quorum noctivago strepitu, ludoque jocanti
Adfirmant volgo taciturna silentia rumpi,
Chordarumque sonos fieri, dulceisque querelas,
Tibia quas fundit digitis pulsata canentum:
Et genus agricolûm latè sentiscere, quom Pan
Pinea semiferi capitis velamina quassans,
Unco sæpe labro calamos percurrit hianteis,
Fistula silvestrem ne cesset fundere musam."
(LUCRETIUS, Lib. iv l. 576.)

"This shows thee why, whilst men, through caves and groves,
Call their lost friends, or mourn unhappy loves,
The pitying rocks, the groaning caves return
Their sad complaints again, and seem to mourn:
This all observe, and I myself have known
Both rocks and hills return six words for one:
The dancing words from hill to hill rebound,
They all receive, and all restore the sound:
The vulgar and the neighbours think, and tell,
That there the Nymphs, and Fauns, and Satyrs dwell:
And that their wanton sport, their loud delight,
Breaks through the quiet silence of the night:
Their music's softest airs fill all the plains,
And mighty Pan delights the list'ning swains:
The goat-faced Pan, whose flocks securely feed;
With long-hung lip he blows his oaken reed:
The horned, the half-beast god, when brisk and gay,
With pine-leaves crowned, provokes the swains to play."
(CREECH'S *Translation*.)

SELBORNE, *Feb.* 12, 1778.

LETTER LXXXI.

TO THE HONOURABLE DAINES BARRINGTON.

AMONG the many singularities attending those amusing birds the swifts, I am now confirmed in the opinion that we have every year the same number of pairs invariably; at least the result of my inquiry has been exactly the same for a long time past. The swallows and martins are so numerous, and so widely distributed over the village, that it is hardly possible to re-count them; while the swifts, though they do not all build in the church, yet so frequently haunt it, and play and rendezvous round it, that they are easily enumerated. The number that I constantly find are eight pairs; about half of which reside in the church, and the rest build in some of the lowest and meanest thatched cottages. Now as these eight pairs, allowance being made for accidents, breed yearly eight pairs more, what becomes of this annual increase; and what determines every spring which pairs shall visit us, and reoccupy their ancient haunts?

Ever since I have attended to the subject of ornithology, I have always supposed that that sudden

reverse of affection, that strange ἀντιστοργὴ, or antipathy, which immediately succeeds in the feathered kind to the most passionate fondness, is the occasion of an equal dispersion of birds over the face of the earth. Without this provision one favourite district would be crowded with inhabitants, while others would be destitute and forsaken. But the parent birds seem to maintain a jealous superiority, and to oblige the young to seek for new abodes: and the rivalry of the males, in many kinds, prevents their crowding the one on the other. Whether the swallows and house-martins return in the same exact number annually is not easy to say, for reasons given above: but it is apparent, as I have remarked before in my Monographies, that the numbers returning bear no manner of proportion to the numbers retiring.

SELBORNE, *May* 13, 1778.

LETTER LXXXII.

TO THE HONOURABLE DAINES BARRINGTON.

THE standing objection to botany has always been, that it is a pursuit that amuses the fancy and exercises the memory, without improving the mind or advancing any real knowledge: and, where the science is carried no farther than a mere systematic classification, the charge is but too true. But the botanist that is desirous of wiping off this aspersion should be by no means content with a list of names; he should study plants philosophically, should investigate the laws of vegetation, should examine the powers and virtues of efficacious herbs, should promote their cultivation; and graft the gardener, the planter, and the husbandman, on the phytologist.* Not that system is by any means to be thrown aside; without system the field of Nature would be a pathless wilderness: but system should be subservient to, not the main object of, pursuit.

* The structure and organization of plants as a science, as well as the study of their properties and cultivation, have advanced with immense strides since our author wrote, and few matters are now better understood by those who take an interest in them.—ED.

Vegetation is highly worthy of our attention; and in itself is of the utmost consequence to mankind, and productive of many of the greatest comforts and elegancies of life. To plants we owe timber, bread, beer, honey, wine, oil, linen, cotton, &c. what not only strengthens our hearts, and exhilarates our spirits, but what secures us from inclemencies of weather and adorns our persons. Man, in his true state of nature, seems to be subsisted by spontaneous vegetation: in middle climes, where grasses prevail, he mixes some animal food with the produce of the field and garden:* and it is towards the polar extremes only that, like his kindred bears and wolves, he gorges himself with flesh alone, and is driven, to what hunger has never been known to compel the very beasts, to prey on his own species.†

The productions of vegetation have had a vast influence on the commerce of nations, and have been the great promoters of navigation, as may be seen in the articles of sugar, tea, tobacco, opium, ginseng,

* The kings of Rome seem to have been their own gardeners, for Pliny tells us that Tarquin sent a certain cruel and sanguinary order from the garden he was then cultivating with his own hands to his son; and he adds, "At the present day, under the name of Horturum, we have pleasure-grounds in the very heart of the city as well as extensive fields and villas."

James I. of Scotland sung of—

> "A garden fair, and in the corner is set
> Ane herbere green."

Shakespeare and Milton had grand conceptions of a garden; Pope improved them by his satire; Shenston created one of the finest gardens in the country, and sung its charms in his pastorals; and Walpole wrote of gardening as a relaxation of statesmanship.—ED.

† In allusion to the supposed cannibalism of the South Sea Islanders.—ED.

betel, paper, &c. As every climate has its peculiar produce, our natural wants bring on a mutual intercourse; so that by means of trade each distant part is supplied with the growth of every latitude. But, without the knowledge of plants and their culture, we must have been content with our hips and haws, without enjoying the delicate fruits of India and the salutiferous drugs of Peru.

Instead of examining the minute distinctions of every various species of each obscure genus, the botanist should endeavour to make himself acquainted with those that are useful. You shall see a man readily ascertain every herb of the field, yet hardly know wheat from barley, or at least one sort of wheat or barley from another.

But of all sorts of vegetation the grasses seem to be most neglected; neither the farmer nor the grazier seem to distinguish the annual from the perennial, the hardy from the tender, nor the succulent and nutritive from the dry and juiceless.

The study of grasses would be of great consequence to a northerly, and grazing kingdom. The botanist that could improve the sward of the district where he lived would be an useful member of society: to raise a thick turf on a naked soil would be worth volumes of systematic knowledge; and he would be the best commonwealth's man that could occasion the growth of "two blades of grass where only one was seen before."

SELBORNE, *June* 2, 1778.

LETTER LXXXIII.

TO THE HONOURABLE DAINES BARRINGTON.

IN a district so diversified with such a variety of hill and dale, aspects, and soils, it is no wonder that great choice of plants should be found. Chalks, clays, sands, sheep walks and downs, bogs, heaths, woodlands, and champaign fields, cannot but furnish an ample Flora. The deep rocky lanes abound with *filices*, and the pastures and moist woods with *fungi*. If in any branch of botany we may seem to be wanting, it must be in the large aquatic plants, which are not to be expected on a spot far removed from rivers, and lying up amidst the hill country at the spring heads. To enumerate all the plants that have been discovered within our limits would be a needless work; but a short list of the more rare, and the spots where they are to be found, may be neither unacceptable nor unentertaining:—

Stinking Hellebore (*Helleborus fœtidus*), Bear's foot, or Setterwort, all over the High-wood and Coney-croft-hanger; this continues a great branching plant the winter through, blossoming about January, and is very ornamental in shady walks and shrubberies. The good women give the leaves powdered to children troubled with worms; but it is a violent remedy, and ought to be administered with caution.

Green Hellebore (*Helleborus viridis*), in the deep stony lane on the left hand just before the turning to Norton farm, and at the top of Middle Dorton under the hedge; this plant dies down to the ground early in autumn, and springs again about February, flowering almost as soon as it appears above ground.

Creeping Bilberry, or Cranberries (*Vaccinium oxycoccos*), in the bogs of Bin's-pond.

Whortle, or Bilberries (*Vaccinium myrtillus*), on the dry hillocks of Wolmer forest.

Round-leaved Sundew (*Drosera rotundiflora*), and Long-leaved Sundew (*Drosera longifolia*), in the bogs of Bin's-pond.

Purple Comarum (*Comarum palustre*), or Marsh Cinquefoil, in the bogs of Bin's-pond.

Tustan, or St. John's Wort (*Hypericum androsæmum*), in the stony, hollow lanes.

Lesser Periwinkle (*Vinca minor*), in Selborne-hanger and Shrub-wood.

Yellow Monotropa (*Monotropa hypopithys*), or Bird's nest, in Selborne-hanger under the shady beeches, to whose roots it seems to be parasitical, at the north-west end of the Hanger.

Perfoliated Yellow-wort (*Chlora perfoliata, Blackstonia perfoliata, Hudsonii*), on the banks in the King's-field.

Herb Paris (*Paris quadrifolia*), True-love, or One-berry, in the Church-litten-coppice.

Opposite Golden Saxifrage (*Chrysosplenium oppositifolium*), in the dark and rocky hollow lanes.

Autumnal Gentian (*Gentiana amarella*), or Fellwort, on the Zig-zag and Hanger.

Tooth-wort (*Lathræa squammaria*), in the Church-litten-coppice under some hazels near the foot-bridge, in Trimming's garden hedge, and on the dry wall opposite Grange-yard.

Small Teasel (*Dipsacus pilosus*), in the Short and Long Lith.

Narrow-leaved, or Wild Lathyrus (*Lathyrus sylvestris*), in the bushes at the foot of the Short Lith, near the path.

Ladies Traces (*Ophrys spiralis*), in the Long Lith, and towards the south corner of the common.

Birds' Nest Ophrys (*Ophrys nidus avis*), in the Long Lith, under the shady beeches among the dead leaves; in Great Dorton among the bushes, and on the Hanger plentifully.

Helleborine (*Serapias latifolia*), in the High-wood under the shady beeches.

Spurge Laurel (*Daphne laureola*), in Selborne Hanger and the High-wood.

The Mezereon (*Daphne mezereum*), in Selborne Hanger among the shrubs at the south-east end above the cottages.
Truffles(*Lycoperdon tuber*), in the Hanger and High-wood.
Dwarf Elder, Walwort or Danewort (*Sambucus ebulus*), among the rubbish and ruined foundations of the Priory.

Of all the propensities of plants none seem more strange than their different periods of blossoming. Some produce their flowers in the winter, or very first dawnings of spring; many when the spring is established; some at midsummer, and some not till autumn. When we see the *helleborus fœtidus* and *helleborus niger* blowing at Christmas, the *helleborus hyemalis* in January, and the *helleborus viridis* as soon as ever it emerges out of the ground, we do not wonder, because they are kindred plants that we expect should keep pace the one with the other. But other congenerous vegetables differ so widely in their time of flowering, that we cannot but admire. I shall only instance at present in the *crocus sativus*, the vernal, and the autumnal crocus, which have such an affinity, that the best botanists only make them varieties of the same genus, of which there is only one species;* not being able to discern any difference in the corolla, or in the internal structure. Yet the vernal crocus expands its flowers by the beginning of March at farthest, and often even in very rigorous weather; they cannot be retarded but by some violence offered:—while the autumnal (the Saffron) defies the influence of the spring and summer, and will not blow till most plants begin to fade and run to seed. This circumstance is one of the wonders of the creation, little noticed, because a common occurrence: yet it ought not to be over-

* Botanists now find upwards of thirty species of this genus, of which four are indigenous to our island.—Ed.

looked because it is familiar, since it would be as difficult to be explained as the most stupendous phænomenon in nature.

"Say, what impels, amidst surrounding snow
Congealed, the crocus' flamy bud to glow?
Say, what retards, amidst the summer's blaze,
Th' autumnal bulb, till pale, declining days?
The GOD of SEASONS; whose pervading power
Controls the sun, or sheds the fleecy shower:
He bids each flower his quick'ning word obey;
Or to each lingering bloom enjoins delay."

SELBORNE, *July* 3, 1778.

LETTER LXXXIV.

TO THE HONOURABLE DAINES BARRINGTON.

"Omnibus animalibus reliquis certus et uniusmodi, et in suo cuique genere incessus est: aves solæ vario meatu feruntur, et in terrâ, et in aëre."—PLIN. *Hist. Nat.* lib. x. cap. 38.

"All animals have a certain definite and peculiar gait; birds alone move in a *varied* manner both on the ground and in the air."

A GOOD ornithologist should be able to distinguish birds by their air as well as by their colours and shape; on the ground as well as on the wing, and in the bush as well as in the hand. For, though it must not be said that every species of birds has a manner peculiar to itself, yet there is somewhat in most genera at least, that at first sight discriminates them, and enables a judicious observer to pronounce upon them with some certainty.* Put a bird in motion "and it is truly betrayed by its gait."

"— — Et vera incessu patuit — — — —"

Thus kites and buzzards sail round in circles with wings expanded and motionless; and it is from their

* The shepherd can distinguish each individual sheep, and no doubt every individual bird can be distinguished by a very acute observer.—ED.

gliding manner that the former are still called in the north of England and Scotland "gleds," from the Saxon verb glidan, to glide. The kestrel, or wind-hover, has a peculiar mode of hanging in the air in one place, his wings all the while being briskly agitated. Hen-harriers fly low over heaths or fields of corn, and beat the ground regularly like a pointer or setting-dog. Owls move in a buoyant manner, as if lighter than the air; they seem to want ballast. There is a peculiarity belonging to ravens that must draw the attention even of the most incurious—they spend all their leisure time in striking and cuffing each other on the wing in a kind of playful skirmish; and, when they move from one place to another, frequently turn on their backs with a loud croak, and seem to be falling to the ground. When this odd gesture betides them, they are scratching themselves with one foot, and thus lose the centre of gravity. Rooks sometimes dive and tumble in a frolicsome manner; crows and daws swagger in their walk; wood-peckers fly *volatu undoso*, opening and closing their wings at every stroke, and so are always rising or falling in curves. All of this genus use their tails, which incline downward, as a support while they run up trees. Parrots, like all other hooked-clawed birds, walk awkwardly, and make use of their bill as a third foot, climbing and descending with ridiculous caution. All the *gallinæ* parade and walk gracefully, and run nimbly; but fly with difficulty, with an impetuous whirring, and in a straight line. Magpies and jays flutter with powerless wings, and make no dispatch; herons seem encumbered with too much sail for their light bodies; but these vast hollow wings are necessary in carrying burdens, such as

large fishes, and the like; pigeons, and particularly the sort called "smiters," have a way of clashing their wings, the one against the other, over their backs with a loud snap; another variety called tumblers, turn themselves over in the air. Some birds have movements peculiar to the season of love: thus ring-doves, though strong and rapid at other times, yet, in the spring, hang about on the wing in a toying and playful manner; thus the cock-snipe, while breeding, forgetting his former flight, fans the air like the wind-hover; and the green-finch in particular, exhibits such languishing, and faltering gestures, as to appear like a wounded and dying bird; the king-fisher darts along like an arrow; fern-owls, or goat-suckers, glance in the dusk over the tops of trees like a meteor; starlings as it were swim along, while missel-thrushes use a wild and desultory flight; swallows sweep over the surface of the ground and water, and distinguish themselves by rapid turns and quick evolutions; swifts dash round in circles; and the bank-martin moves with frequent vacillations like a butterfly. Most of the small birds fly by jerks, rising and falling as they advance; many of them hop; but wagtails and larks walk, moving their legs alternately. Skylarks rise and fall perpendicularly as they sing; woodlarks hang poised in the air; and titlarks rise and fall in large curves, singing in their descent. The white-throat uses odd jerks and gesticulations over the tops of hedges and bushes. All the duck-kind waddle; divers, and auks, walk as if fettered, and stand erect on their tail: these are the *compedes* of Linnæus. Geese and cranes, and most wild-fowls, move in figured flights, often changing their position. The secondary

remiges of *Tringæ*, wild-ducks, and some others, are very long, and give their wings, when in motion, a hooked appearance. Dab-chicks, moor-hens, and coots, fly erect, with their legs hanging down, and hardly make any dispatch; the reason is plain, their wings are placed too forward out of the true centre of gravity for rapid progression; as the legs of auks and divers are situated too backward.

SELBORNE, *Aug.* 7, 1778.

LETTER LXXXV.

TO THE HONOURABLE DAINES BARRINGTON.

FROM the motion of birds, the transition is natural enough to their notes and language, of which I shall say something. Not that I would pretend to understand their language like the vizier of the Spectator, who, by the recital of a conversation which passed between two owls, reclaimed a sultan, before delighting in conquest and devastation; but I would be thought only to mean that many of the winged tribes have various sounds and voices adapted to express their various passions, wants, and feelings; such as anger, fear, love, hatred, hunger, and the like. All species are not equally eloquent; some are copious and fluent as it were in their utterance, while others are confined to a few important sounds: no bird, like the fish-kind,* is quite mute, though some are rather silent. The language of birds is very ancient, and, like other ancient modes of speech, very ellipti-

* There are several fish which make a croaking noise when taken out of the water; but in all probability the sound is caused by their gasping attempts to breathe when they find themselves in a thinner element.—Ed.

cal; little is said, but much is meant and understood.

The notes of the eagle-kind are shrill and piercing; and about the season of nidification much diversified, as I have been often assured by a curious observer of Nature, who long resided at Gibraltar, where eagles abound. The notes of our hawks much resemble those of the king of birds. Owls have very expressive notes; they hoot in a fine vocal sound, much resembling the *vox humana*, and reducible by a pitch-pipe to a musical key.* This note seems to express complacency and rivalry among the males: they use also a quick call and a horrible scream; and can snore and hiss when they mean to menace. Ravens, besides their loud croak, can exert a deep and solemn note that makes the woods to echo; the amorous sound of a crow is strange and ridiculous; rooks, in the breeding season, attempt sometimes in the gaiety of their hearts to sing, but with no great success; the parrot-kind have many modulations of voice as appears by their aptitude to learn human sounds; doves coo in an amorous and mournful manner, and are emblems of despairing lovers; the woodpecker sets up a sort of loud and hearty laugh; the fern-owl, or goat-sucker, from the dusk till day-break, serenades his mate with the clattering of

* The brown owl hoots, the white owl shrieks. Sir William Jardine says the latter hoots also, which Mr. Waterton denies, claiming that pleasant sound for the tawny owl. In some manuscript notes of Mr. M'Gillivray now before me, he says,—"On the 21st of September, 1851, I listened to the cry of the tawny owl in the woods of Banchory. It certainly caused no melancholy or mysterious sensation. At intervals a protracted loud and clear *hoo-e* was emitted, then a sound of a different character, less loud, ending in a tremulous note, *hu-hoo-e-e-e-e*."—ED.

castanets. All the tuneful *passeres* express their complacency by sweet modulations, and a variety of melody. The swallow, as has been observed in a former letter, by a shrill alarm bespeaks the attention of the other *hirundines*, and bids them be aware that the hawk is at hand. Aquatic and gregarious birds, especially the nocturnal, that shift their quarters in the dark, are very noisy and loquacious; as cranes, wild-geese, wild-ducks, and the like: their perpetual clamour prevents them from dispersing and losing their companions.

In so extensive a subject, sketches and outlines are as much as can be expected; for it would be endless to instance in all their infinite variety the notes of the feathered nation.* I shall therefore confine

* The call of birds is one of the most interesting as well as the most mysterious studies of nature; the external air is admitted to the lungs and the cells dispersed all over the body, and again expelled by the external expansion and contraction of the thoracic and abdominal cavities moved by their several muscles. Its passage takes place through a tube which commences immediately behind the base of the tongue, extends along the fore-part or side of the neck, enters the thorax between the clavicles or wing-bones, and divides into two branches, of which one enters each lung, while a very slender muscle passes down on each side of the trachea.

The trachea itself is an elastic tube, a little flattened in song-birds, and of the same diameter throughout, with sixty thin elastic bony rings, lined with a smooth nervous membrane, and covered externally with layers of cellular tissue, and extremely flexible, contractile and extensible, in order to accommodate itself to the contractions and extensions of the neck, the muscles acting upon it being extremely complicated. Now, it is at the lower extremity of the windpipe that the sounds of the voice of birds is produced, and modulated by the larynx so as to be formed into notes. "If we take the trachea of a rook or blackbird," says M'Gillivray, "and blow through its two bronchii, a sound is produced having some resemblance to the cry of the bird." Again he says, "Cut the trachea across, and blow into the bronchii, the same sound is produced as before;" and this continues

the remainder of this letter to the few domestic fowls of our yards, which are most known, and therefore best understood. And first the peacock, with his gorgeous train, demands our attention; but, like most of the gaudy birds, his notes are grating and shocking to the ear: the yelling of cats, and the braying of an ass, are not more disgustful. The voice of the goose is trumpet-like, and clanking; and once saved the

until all is cut away to two or three rings, although the sound is feebler. It is in the vacuity of the lower larynx that the vibrating membrane is placed.

"Such," continues M'Gillivray, "is the apparatus by which the voice of birds is attended. The air contained in the lungs and air-cells passing through the bronchii causes the vocal membrane at their extremity to vibrate, and sounds are produced which become acute or grave by the relaxation or tension of the parts. The modifications of these organs in different species are slight, and in all I have examined the parts and number of muscles are the same; the peculiar song of different species depending upon circumstances beyond our cognition, for surely the hooded crow, the raven, and the rook, cannot require as complex an apparatus to produce their unmusical cry, as that which the blackbird, thrush, nightingale, and linnet employ in modulating their voices, so as to give utterance to those melodies which are so delightful to us. The knife, the needle, and the lens, however, do not enable us to detect any superiority in the warbler over the crow." In the common linnet the parts in question present no very remarkable differences; as compared with the blackbird, the trachea is flattened and tapering, and the contractor muscle is spread over its whole surface. In the pigeons the number of rings in the trachea are increased to a hundred and ten, and the bronchial half-rings to ten. And on blowing through it a tremulous murmuring sound is produced; while in the gallinaceous birds represented by the ptarmigan, *Sagopus Scoticus*, the trachea is composed of about seventy rings, tapering considerably towards the lower extremity; the rings are then broader in front, the bronchii are wide, and have fifteen half-rings, the muscles are less complex, and the lower larynx destitute of muscle. The inference M'Gillivray draws from these facts is that the more simple the voice the less complex is the muscular apparatus of the lower larynx.—ED.

Capitol at Rome, as grave historians assert; the hiss also of the gander is formidable and full of menace, and "protective of his young." Among ducks the sexual distinction of voice is remarkable; for, while the quack of the female is loud and sonorous, the voice of the drake is inward and harsh, and feeble, and scarce discernible. The cock turkey struts and gobbles to his mistress in a most uncouth manner; he hath also a pert and petulant note when he attacks his adversary. When a hen turkey leads forth her young brood she keeps a watchful eye; and if a bird of prey appear, though ever so high in the air, the careful mother announces the enemy with a little inward moan, and watches him with a steady and attentive look; but, if he approach, her note becomes earnest and alarming, and her outcries are redoubled.

No inhabitants of the yard seem possessed of such a variety of expression, and so copious a language as common poultry. Take a chicken of four or five days old, and hold it up to a window where there are flies, and it will immediately seize its prey, with little twitterings of complacency; but if you tender it a wasp or a bee, at once its note becomes harsh, and expressive of disapprobation, and a sense of danger. When a pullet is ready to lay she intimates the event by a joyous soft and easy note. Of all the occurrences of their life that of laying seems to be the most important; for no sooner has a hen disburdened herself, than she rushes forth with a clamorous kind of joy, which the cock and the rest of his mistresses immediately adopt. The tumult is not confined to the family concerned, but catches from yard to yard, and spreads to every homestead within hearing, till at last the whole village is in an uproar. As soon as a hen becomes a mother her

new relation demands a new language; she then runs clucking and screaming about, and seems agitated, as if possessed. The father of the flock has also a considerable vocabulary; if he finds food, he calls a favourite concubine to partake; and if a bird of prey passes over, with a warning voice he bids his family beware. The gallant chanticleer has, at command, his amorous phrases and his terms of defiance. But the sound by which he is best known is his crowing; by this he has been distinguished in all ages as the countryman's clock or larum, as the watchman that proclaims the divisions of the night. Thus the poet elegantly styles him:

> "— — the crested cock, whose clarion sounds
> The silent hours."

A neighbouring gentleman one summer had lost most of his chickens by a sparrow-hawk, that came gliding down between a faggot pile, and the end of his house, to the place where the coops stood. The owner, inwardly vexed to see his flock thus diminishing, hung a setting net adroitly between the pile and the house, into which the caitif dashed, and was entangled. Resentment suggested the law of retaliation; he therefore clipped the hawk's wings, cut off his talons, and, fixing a cork on his bill, threw him down among the brood-hens. Imagination cannot paint the scene that ensued; the expressions that fear, rage, and revenge, inspired, were new, or at least such as had been unnoticed before: the exasperated matrons upbraided, they execrated, they insulted, they triumphed. In a word, they never desisted from buffetting their adversary till they had torn him in a hundred pieces.

SELBORNE, *Sept.* 9, 1778.

LETTER LXXXVI.

TO THE HONOURABLE DAINES BARRINGTON.

"— — — — — — — monstrent
— — — — — — — — —
Quid tantum Oceano properent se tingere soles
Hyberni; vel quæ tardis mora noctibus obstet."
(VIRG. *Georg.* ii. 477—482.)

"How winter suns in ocean plunge so soon,
And what belates the tardy nights of June."

GENTLEMEN who have outlets might contrive to make ornament subservient to utility; a pleasing eye-trap might also contribute to promote science: an obelisk in a garden or park might be both an embellishment and an heliotrope.

Any person that is curious, and enjoys the advantage of a good horizon, might, with little trouble, make two heliotropes; the one for the winter, the other for the summer solstice: and these two erections might be constructed with very little expense; for two pieces of timber framework, about ten or twelve feet high, and four feet broad at the base, close lined with plank, would answer the purpose.

The erection for the former should, if possible, be placed within sight of some window in the common sitting parlour; because men, at that dead season of

the year, are usually within doors at the close of the day; while that for the latter might be fixed for any given spot in the garden or outlet: whence the owner might contemplate, in a fine summer's evening, the utmost extent that the sun makes to the northward at the season of the longest days. Now nothing would be necessary but to place these two objects with so much exactness, that the westerly limb of the sun, at setting, might but just clear the winter heliotrope to the west of it on the shortest; the whole disc of the sun clearing the summer heliotrope to the north of it at the longest day.

By this simple expedient it would soon appear that there is no such thing, strictly speaking, as a solstice; for, from the shortest day, the owner would, every clear evening, see the disc advancing, at its setting, to the westward of the object; and, from the longest day, observe the sun retiring backwards every evening at its setting, towards the object westward, till, in a few nights, it would set quite behind it, and so by degrees to the west of it: for when the sun comes near the summer solstice, the whole disc of it would at first set behind the object; after a time the northern limb would first appear, and so every night gradually more, till at length the whole diameter would set northward of it for about three nights; but on the middle night of the three, sensibly more remote than the former or following. When receding from the summer tropic, it would continue more and more to be hidden every night, till at length it would descend behind the object again; and so nightly more and more to the westward.

SELBORNE.

LETTER LXXXVII.

TO THE HONOURABLE DAINES BARRINGTON.

"— — — Mugire videbis
Sub pedibus terram, et descendere montibus ornos."
(VIRG. *Æn.* iv. 490, 491.)

"Earth bellows,
Trees leave their mountains at her potent call;
Beneath her footsteps groans the trembling ball."
(PITT.)

WHEN I was a boy I used to read, with astonishment and implicit assent, accounts in Baker's Chronicle of walking hills and travelling mountains. John Philips, in his Cyder, alludes to the credit given to such stories with a delicate but quaint vein of humour peculiar to the author of the Splendid Shilling.

"I nor advise, nor reprehend the choice
Of Marcley Hill; the apple no where finds
A kinder mould: yet 'tis unsafe to trust
Deceitful ground: who knows but that once more
This mount may journey, and his present site
Forsaken, to thy neighbours bounds transfer
Thy goodly plants affording matter strange
For law debates!"

But, when I came to consider better, I began to suspect that though our hills may never have journeyed far, yet that the ends of many of them have slipped

and fallen away at distant periods, leaving the cliffs bare and abrupt. This seems to have been the case with Nore and Whetham Hills; and especially with the ridge between Harteley Park and Ward le ham, where the ground has slid into vast swellings and furrows; and lies still in such romantic confusion as cannot be accounted for from any other cause. A strange event, that happened not long since justifies our suspicions; which, though it befell not within the limits of this parish, yet as it was within the hundred of Selborne, and as the circumstances were singular, may fairly claim a place in this work.

The months of January and February, in the year 1774, were remarkable for great melting snows and vast gluts of rain; so that by the end of the latter month the land-springs, or lavants, began to prevail, and to be near as high as in the memorable winter of 1764. The beginning of March also went on in the same tenor; when, in the night between the 8th and 9th of that month, a considerable part of the great woody hanger at Hawkley was torn from its place, and fell down, leaving a high free-stone cliff naked and bare, and resembling the steep side of a chalk-pit. It appears that this huge fragment, being perhaps sapped and undermined by waters, foundered, and was ingulfed, going down in a perpendicular direction; for a gate which stood in the field, on the top of the hill, after sinking with its posts for thirty or forty feet, remained in so true and upright a position as to open and shut with great exactness, just as in its first situation. Several oaks also are still standing, and in a state of vegetation, after taking the same desperate leap. That great part of this prodigious mass was absorbed in some gulf below, is plain also

from the inclining ground at the bottom of the hill, which is free and unincumbered; but would have been buried in heaps of rubbish, had the fragment parted and fallen forward. About an hundred yards from the foot of this hanging coppice stood a cottage by the side of a lane; and two hundred yards lower, on the other side of the lane, was a farm-house, in which lived a labourer and his family; and, just by, a stout new barn. The cottage was inhabited by an old woman and her son, and his wife. These people in the evening, which was very dark and tempestuous, observed that the brick floors of their kitchens began to heave and part; and that the walls seemed to open, and the roofs to crack: but they all agree that no tremor of the ground, indicating an earthquake, was ever felt; only that the wind continued to make a most tremendous roaring in the woods and hangers. The miserable inhabitants, not daring to go to bed, remained in the utmost solicitude and confusion, expecting every moment to be buried under the ruins of their shattered edifices. When day-light came they were at leisure to contemplate the devastations of the night: they then found that a deep rift, or chasm, had opened under their houses, and torn them, as it were, in two; and that one end of the barn had suffered in a similar manner; that a pond near the cottage had undergone a strange reverse, becoming deep at the shallow end, and so *vice versâ*; that many large oaks were removed out of their perpendicular, some thrown down, and some fallen into the heads of neighbouring trees; and that a gate was thrust forward, with its hedge, full six feet, so as to require a new track to be made to it. From the foot of the cliff the general course of the ground, which is pasture, inclines in a

moderate descent for half a mile, and is interspersed with some hillocks, which were rifted, in every direction, as well towards the great woody hanger, as from it. In the first pasture the deep clefts began: and running across the lane, and under the buildings, made such vast shelves that the road was impassable for some time; and so over to an arable field on the other side, which was strangely torn and disordered. The second pasture field, being more soft and springy, was protruded forward without many fissures in the turf, which was raised in long ridges resembling graves, lying at right angles to the motion. At the bottom of this enclosure the soil and turf rose many feet against some oaks that obstructed their farther course, and terminated this awful commotion.

The perpendicular height of the precipice, in general, is twenty-three yards; the length of the lapse, or slip, as seen from the fields below, one hundred and eighty-one; and a partial fall, concealed in the coppice, extends seventy yards more: so that the total length of this fragment that fell was two hundred and fifty-one yards. About fifty acres of land suffered from this violent convulsion; two houses were entirely destroyed; one end of a new barn was left in ruins, the walls being cracked through the very stones that composed them; a hanging coppice was changed to a naked rock; and some grass grounds and an arable field so broken and rifted by the chasms as to be rendered, for a time, neither fit for the plough or safe for pasturage, till considerable labour and expense had been bestowed in levelling the surface and filling in the gaping fissures.

SELBORNE.

LETTER LXXXVIII.

TO THE HONOURABLE DAINES BARRINGTON.

"— — — resonant arbusta — — —"
(VIRG. *Ecl.* ii. 13.)
"The groves resound."

THERE is a steep abrupt pasture field interspersed with furze close to the back of this village, well known by the name of the Short Lithe, consisting of a rocky dry soil, and inclining to the afternoon sun. This spot abounds with *gryllus campestris*, or field-cricket, which, though frequent in these parts, is by no means a common insect in many other counties.

As their cheerful summer cry cannot but draw the attention of a naturalist, I have often gone down to examine the œconomy of these *grylli*, and study their mode of life: but they are so shy and cautious that it is no easy matter to get a sight of them; for, feeling a person's footsteps as he advances, they stop short in the midst of their song, and retire backward nimbly into their burrows, where they lurk till all suspicion of danger is over.

At first we attempted to dig them out with a spade but without any great success; for either we could

not get to the bottom of the hole, which often terminated under a great stone; or else, in breaking up the ground, we inadvertently squeezed the poor insect to death. Out of one so bruised we took a multitude of eggs, which were long and narrow, of a yellow colour, and covered with a very tough skin. By this accident we learned to distinguish the male from the female; the former of which is shining black, with a golden stripe across his shoulders; the latter is more dusky, more capacious about the abdomen, and carries a long sword-shaped weapon at her tail, which probably is the instrument with which she deposits her eggs in their receptacles.

Where violent methods will not avail, more gentle means will often succeed; and so it proved in the present case; for, though a spade be too boisterous and rough an implement, a pliant stock of grass, gently insinuated into the caverns, will probe their windings to the bottom, and quickly bring out the inhabitant; and thus the humane inquirer may gratify his curiosity without injuring the object of it. It is remarkable that, though these insects are furnished with long legs behind, and brawny thighs for leaping, like grasshoppers; yet when driven from their holes they show no activity, but crawl along in a shiftless manner, so as easily to be taken: and again, though provided with a curious apparatus of wings, yet they never exert them when there seems to be the greatest occasion. The males only make that shrilling noise perhaps out of rivalry and emulation, as is the case with many animals which exert some sprightly note during their breeding time: it is raised by a brisk friction of one wing against the other. They are solitary beings, living singly male

or female, each as it may happen; but there must be a time when the sexes have some intercourse, and then the wings may be useful perhaps during the hours of night. When the males meet they will fight fiercely, as I found by some which I put into the crevices of a dry stone wall, where I should have been glad to have made them settle. For though they seemed distressed by being taken out of their knowledge, yet the first that got possession of the chinks would seize on any that were obtruded upon them with a vast row of serrated fangs. With their strong jaws, toothed like the shears of a lobster's claws, they perforate and round their curious regular cells, having no fore-claws to dig, like the mole cricket. When taken in hand I could not but wonder that they never offered to defend themselves, though armed with such formidable weapons. Of such herbs as grow before the mouths of their burrows they eat indiscriminately; and on a little platform, which they make just by, they drop their dung; and never, in the day time, seem to stir more than two or three inches from home. Sitting in the entrance of their caverns they chirp all night as well as day from the middle of the month of May to the middle of July; and in hot weather, when they are most vigorous, they make the hills echo; and, in the stiller hours of darkness, may be heard to a considerable distance. In the beginning of the season their notes are more faint and inward; but become louder as the summer advances, and so die away again by degrees.

Sounds do not always give us pleasure according to their sweetness and melody; nor do harsh sounds always displease. We are more apt to be captivated

or disgusted with the associations which they promote, than with the notes themselves. Thus the shrilling of the field-cricket, though sharp and stridulous, yet marvellously delights some hearers, filling their minds with a train of summer ideas of everything that is rural, verdurous, and joyous.

About the tenth of March the crickets appear at the mouths of their cells, which they then open and bore, and shape very elegantly. They cast their skins in April, which are then seen lying at the mouths of their holes. All that ever I have seen at that season were in their pupa state, and had only the rudiments of wings, lying under a skin or coat, which must be cast, before the insect can arrive at its perfect state; from whence I should suppose that the old ones of last year do not always survive the winter. In August their holes begin to be obliterated, and the insects are seen no more till spring.

Not many summers ago I endeavoured to transplant a colony to the terrace in my garden, by boring deep holes in the sloping turf. The new inhabitants stayed some time, and fed and sung; but wandered away by degrees, and were heard at a farther distance every morning; so that it appears that on this emergency they made use of their wings to return to the spot from which they were taken.

One of these crickets, when confined in a paper cage and set in the sun, and supplied with plants moistened with water, will feed and thrive, and become so merry and loud as to be irksome in the same room where a person is sitting: if the plants are not wetted it will die.

SELBORNE.

LETTER LXXXIX.

TO THE HONOURABLE DAINES BARRINGTON.

"Far from all resort of mirth
Save the cricket on the hearth."
MILTON'S *Il Penseroso.*

WHILE many other insects must be sought after in fields, and woods, and waters, the *gryllus domesticus*, or house-cricket, resides altogether within our dwellings, intruding itself upon our notice whether we will or no. This species delights in new-built houses, being, like the spider, pleased with the moisture of the walls; and besides, the softness of the mortar enables them to burrow and mine between the joints of the bricks or stones, and to open communications from one room to another. They are particularly fond of kitchens and bakers' ovens, on account of their perpetual warmth.

Tender insects that live abroad either enjoy only the short period of one summer, or else doze away the cold uncomfortable months in profound slumbers; but these, residing as it were in a torrid zone, are always alert and merry: a good Christmas fire is to them like the heats of the dog-days. Though they

are frequently heard by day, yet is their natural time of motion only in the night. As soon as it grows dusk, the chirping increases, and they come running forth, ranging from the size of a flea to that of their full stature. As one should suppose, from the burning atmosphere which they inhabit, they are a thirsty race, and show a great propensity for liquids, being found frequently drowned in pans of water, milk, broth, or the like. Whatever is moist they affect; and therefore often gnaw holes in wet woollen stockings and aprons that are hung to the fire: they are the housewife's barometer foretelling her when it will rain; and they prognosticate sometimes, she thinks, good or ill luck; the death of near relations, or the approach of an absent lover. By being the constant companions of her solitary hours they naturally become the objects of her superstition. These crickets are not only very thirsty, but very voracious; for they will eat the scummings of pots, and yeast, salt, and crumbs of bread; and any kitchen offal or sweepings. In the summer we have observed them to fly out of the windows, when it became dusk, and over the neighbouring roofs. This feat of activity accounts for the sudden manner in which they often leave their haunts, as it does for the method by which they come to houses where they were not known before. It is remarkable, that many sorts of insects seem never to use their wings but when they have a mind to shift their quarters and settle new colonies. When in the air they move *volatu undoso*, in "waves or curves," like woodpeckers, opening and shutting their wings at every stroke, and so are always rising or sinking.

When they increase to a great degree, as they

did once in the house where I am now writing, they become noisome pests, flying into the candles, and dashing into people's faces; but may be blasted and destroyed by gunpowder discharged into their crevices and crannies.

[In November, after the servants are gone to bed, the kitchen hearth swarms with minute crickets not so large as fleas, which must have been lately hatched, so that these domestic insects, cherished by the influence of a constant and large fire, regard not the season of the year, but produce their young at a time when their congeners are either dead or laid up for the winter, passing away the uncomfortable months in a state of torpidity.

When house-crickets are out and running about a room in the night, if surprised by a candle, they utter two or three shrill notes, as if it were a signal to their fellows, that they may escape to their crannies and lurking places to avoid danger.]

In families, at such times, they are, like Pharaoh's plague of frogs,—"in their bedchambers, and upon their beds, and in their ovens, and in their kneading-troughs."* Their shrilling noise is occasioned by a brisk attrition of their wings. Cats catch hearth-crickets, and play with them as they do with mice, and then devour them. Crickets may be destroyed, like wasps, by phials half filled with beer, or any other liquid, and set in their haunts; for, being always eager to drink, they will crowd in till the bottles are full.

SELBORNE.

* Exod. viii. 3.

LETTER XC.

TO THE HONOURABLE DAINES BARRINGTON.

HOW diversified are the modes of life not only of incongruous but even of congenerous animals; and yet their specific distinctions are not more various than their propensities. Thus, while the field-cricket delights in sunny dry banks, and the house-cricket rejoices amidst the glowing heat of the kitchen hearth or oven, the *gryllus gryllo talpa* (the mole-cricket), haunts moist meadows, and frequents the sides of ponds and banks of streams, performing all its functions in a swampy wet soil. With a pair of fore-feet, curiously adapted to the purpose, it burrows and works under ground like the mole, raising a ridge as it proceeds, but seldom throwing up hillocks.

As mole-crickets often infest gardens by the sides of canals, they are unwelcome guests to the gardener, raising up ridges in their subterraneous progress, and rendering the walks unsightly. If they take to the kitchen quarters, they occasion great damage among the plants and roots, by destroying whole beds of cabbages, young legumes, and flowers. When dug out they seem very slow and helpless,

and make no use of their wings by day; but at night they come abroad, and make long excursions, as I have been convinced by finding stragglers, in a morning, in improbable places. In fine weather, about the middle of April, and just at the close of day, they begin to solace themselves with a low, dull, jarring note, continued for a long time without interruption, and not unlike the chattering of the fern-owl, or goat-sucker, but more inward.

About the beginning of May they lay their eggs, as I was once an eye-witness: for a gardener at a house, where I was on a visit, happening to be mowing, on the 6th of that month, by the side of a canal, his scythe struck too deep, pared off a large piece of turf, and laid open to view a curious scene of domestic economy:

"— — — — ingentem lato dedit ore fenestram:
Apparet domus intus, et atria longa patescunt:
Apparent — — — penetralia."
(VIRG. *Æn.* ii. 481—483.)

"A yawning breach of monstrous size he made:
The inmost house is now to light displayed:
The admitted light with sudden lustre falls
On the long galleries and the splendid halls."
(DRYDEN.)

There were many caverns and winding passages leading to a kind of chamber, neatly smoothed and rounded, and about the size of a moderate snuff-box. Within this secret nursery were deposited near a hundred eggs of a dirty yellow colour, and enveloped in a tough skin, but too lately excluded to contain any rudiments of young, being full of a viscous substance. The eggs lay but shallow, and within the influence of the sun, just under a little heap of fresh-moved mould, like that which is raised by ants.

When mole-crickets fly they move *cursu unaoso*, rising and falling in curves, like the other species mentioned before. In different parts of this kingdom people call them fen-crickets, churr-worms, and eve-churrs, all very apposite names.

Anatomists, who have examined the intestines of these insects, astonish me with their accounts; for they say that, from the structure, position, and number of their stomachs, or maws, there seems to be good reason to suppose that this and the two former species ruminate or chew the cud like many quadrupeds!*

SELBORNE.

* Professor Owen describes one of these stomachs, of which there is a preparation in the Hunterian Museum. The first cavity, or crop, is appended to one side of the gullet as in granivorous birds. The gizzard is small; a canal intervenes between crop and gizzard; two large lateral pouches opening into the lower part of the gizzard. The analogy, however, between this digestive apparatus and that of a bird is vague, and does not extend beyond the number of cavities.—ED.

LETTER XCI.

TO THE HONOURABLE DAINES BARRINGTON.

IT is now more than forty years that I have paid some attention to the ornithology of this district, without being able to exhaust the subject: new occurrences still arise as long as any inquiries are kept alive.

In the last week of last month five of those most rare birds, too uncommon to have obtained an English name, but known to naturalists by the terms of *himantopus*, or *loripes*, and *charadrius himantopus*, were shot upon the verge of Frinsham-pond, a large lake belonging to the bishop of Winchester, and lying between Wolmer-forest, and the town of Farnham, in the county of Surrey. The pond keeper says there were three brace in the flock; but that, after he had satisfied his curiosity, he suffered the sixth to remain unmolested. One of these specimens I procured, and found the length of the legs to be so extraordinary, that, at first sight, one might have supposed the shanks had been fastened on to impose on the credulity of the beholder: they were legs in *caricatura*; and had we seen such proportions on a Chinese or Japan screen we should have made large

allowances for the fancy of the draughtsman. These birds are of the plover family, and might with propriety be called the stilt plovers. Brisson, under that idea, gives them the apposite name of *l'échasse*. My specimen, when drawn and stuffed with pepper, weighed only four ounces and a quarter, though the naked part of the thigh measured three inches and a half, and the legs four inches and a half. Hence we may safely assert that these birds exhibit, weight for inches, incomparably the greatest length of legs of any known bird. The flamingo, for instance, is one of the most long-legged birds, and yet it bears no manner of proportion to the *himantopus*; for a cock flamingo weighs, at an average, about four pounds avoirdupois; and his legs and thighs measure usually about twenty inches. But four pounds are fifteen times and a fraction more than four ounces, and one quarter; and if four ounces and a quarter have eight inches of legs, four pounds must have one hundred and twenty inches and a fraction of legs; viz. somewhat more than ten feet; such a monstrous proportion as the world never saw! If you should try the experiment in still larger birds the disparity would still increase. It must be matter of great curiosity to see the stilt plover move; to observe how it can wield such a length of lever with such feeble muscles as the thighs seem to be furnished with. At best one should expect it to be but a bad walker: but what adds to the wonder is, that it has no back toe. Now without that steady prop to support its steps it must be liable, in speculation, to perpetual vacillations, and seldom able to preserve the true centre of gravity.

The old name of *himantopus* is taken from Pliny;

and, by an awkward metaphor, implies that the legs are as slender and pliant as if cut out of a thong of leather. Neither Willughby nor Ray, in all their curious researches, either at home or abroad, ever saw this bird. Mr. Pennant never met with it in all Great Britain, but observed it often in the cabinets of the curious at Paris. Hasselquist says that it migrates to Egypt in the autumn: and a most accurate observer of Nature has assured me that he has found it on the banks of the streams in Andalusia.

Our writers record it to have been found only twice in Great Britain. From all these relations it plainly appears that these long-legged plovers are birds of South Europe, and rarely visit our island: and when they do are wanderers and stragglers, and impelled to make so distant and northern an excursion from motives or accidents for which we are not able to account. One thing may fairly be deduced, that these birds come over to us from the continent, since nobody can suppose that a species not noticed once in an age, and of such a remarkable make, can constantly breed unobserved in this kingdom.

SELBORNE, *May* 7, 1779.

LETTER XCII.

TO THE HONOURABLE DAINES BARRINGTON.

THE old Sussex tortoise, that I have mentioned to you so often, is become my property. I dug it out of its winter dormitory in March last, when it was enough awakened to express its resentments by hissing; and packing it in a box with earth, carried it eighty miles in post-chaises. The rattle and hurry of the journey so perfectly roused it that, when I turned it out on a border, it walked twice down to the bottom of my garden; however, in the evening, the weather being cold, it buried itself in the loose mould, and continues still concealed.

As it will be under my eye, I shall now have an opportunity of enlarging my observations on its mode of life, and propensities; and perceive, already, that towards the time of coming forth, it opens a breathing place in the ground near its head, requiring, I conclude, a freer respiration as it becomes more alive. This creature not only goes under the earth from the middle of November to the middle of April, but sleeps great part of the summer; for it goes to bed in the longest days at four in the afternoon, and

often does not stir in the morning till late. Besides, it retires to rest for every shower; and does not move at all in wet days.

When one reflects on the state of this strange being, it is a matter of wonder to find that Providence should bestow such a profusion of days, such a seeming waste of longevity, on a reptile that appears to relish it so little as to squander more than two-thirds of its existence in a joyless stupor, and be lost to all sensation for months together in the profoundest of slumbers.

While I was writing this letter, a moist and warm afternoon, with the thermometer at fifty, brought forth troops of shell-snails; and, at the same juncture, the tortoise heaved up the mould and put out its head; and the next morning came forth, as it were raised from the dead; and walked about till four in the afternoon. This was a curious coincidence! a very amusing occurrence! to see such a similarity of feelings between the two φρεσίκοι! for so the Greeks call both the shell-snail and the tortoise.*

Because we call "the old family tortoise" an abject reptile, we are too apt to undervalue his abilities, and depreciate his powers of instinct. Yet he is, as Mr. Pope says of his lord,

"— — — Much too wise to walk into a well:"

and has so much discernment as not to fall down an ha-ha: but to stop and withdraw from the brink with the readiest precaution.

Though he loves warm weather he avoids the hot

* Mr. Bell, who possesses the shell of old Timothy, thinks it the *Testudina marginata*, Schœpff. Mr. E. T. Bennett finds specific variations, which he thinks constitute a new species, and calls it *T. Whetée*.—Ed.

sun; because his thick shell when once heated, would, as the poet says of solid armour—"scald with safety." He therefore spends the more sultry hours under the umbrella of a large cabbage-leaf, or amidst the waving forests of an asparagus-bed.

But as he avoids heat in the summer, so, in the decline of the year, he improves the faint autumnal beams, by getting within the reflection of a fruit-wall; and, though he never has read that planes inclining to the horizon receive a greater share of warmth,* he inclines his shell, by tilting it against the wall, to collect and admit every feeble ray.

Pitiable seems the condition of this poor embarrassed reptile: to be cased in a suit of ponderous armour, which he cannot lay aside; to be imprisoned, as it were, within his own shell, must preclude, we should suppose, all activity and disposition for enterprize. Yet there is a season of the year (usually the beginning of June) when his exertions are remarkable. He then walks on tiptoe, and is stirring by five in the morning; and, traversing the garden, examines every wicket and interstice in the fences, through which he will escape if possible; and often has eluded the care of the gardener, and wandered to some distant field. The motives that impel him to undertake these rambles seem to be of

* Some curious experiments on inclined walls have been published by the Caledonian Horticultural Society, from which it appears that a wall sloping at an angle of 50 degrees, and a vertical one were of the same temperature at 6 p.m. in April; at 1 o'clock in the day the sloping wall was 7 degrees warmer; at 6 o'clock the same day the sloping wall was only 2 degrees above the vertical wall. In frosty weather, however, the sloping wall was 3 degrees colder in the night. It thus appears that Timothy was justified by science in inclining his shell to the noon-day sun, seeing warmth was his object.—ED.

the amorous kind: his fancy then becomes intent on sexual attachments, which transport him beyond his usual gravity, and induce him to forget for a time his ordinary solemn deportment.*

Summer birds are, this cold and backward spring, unusually late: I have seen but one swallow yet. This conformity with the weather convinces me more and more that they sleep in the winter.

SELBORNE, *April* 21, 1780.

* "We think we see the worthy pastor," writes the late Mr. Broderip, "looking down with the air of the melancholy Jaques, on his favourite, as those thoughts occur to him. It is very possible that Cupid may have been bestriding the reptile. White's description looks like the restlessness of passion; but the love of liberty, and not improbably an annual migratory impulse to search for fresh pasture may have been the prevailing motive." The tenacity of life with which the *testudinata* are gifted is hardly credible. Rede's operations would have been instant death to any more warm-blooded animal. He opened the skull of a land tortoise, and, removing every particle of brain, cleaned the cavity out. It still groped its way about freely, for with the brain its sight departed; but it lived from November till May. After many other equally cruel experiments, one November he cut off the head of a large tortoise, and it lived for twenty-three days. But, retiring within its shell, it has its privileges.

"The tortoise securely from danger does well
When he tucks up his head and his tail in his shell."

LETTER XCIII.

TO THOMAS PENNANT, ESQ.

A PAIR of honey-buzzards,* *Buteo apivorus*, Linn. sive *Vespivorus*, Raii, built them a large shallow nest, composed of twigs and lined with dead beechen leaves, upon a tall slender beech near the middle of Selborne-hanger, in the summer of 1780. In the middle of the month of June a bold boy climbed this tree, though standing on so steep and dizzy a situation, and brought down an egg, the only one in the nest, which had been sat on for some time, and contained the embrio of a young bird. The egg was smaller, and not so round as those of the common buzzard; was dotted at each end with small red spots, and surrounded in the middle with a broad bloody zone.

The hen-bird was shot and answered exactly to Mr. Ray's description of that species; had a black cere, short thick legs, and a long tail. When on the wing this species may be easily distinguished

* The Honey-buzzard is of rare occurrence in any part of Britain, and its habits very little known. Its nest resembles that of the common buzzard, and has been found in the woods of Abergeldie, on Dee side, where it builds in trees. —Ed.

from the common buzzard by its hawk-like appearance, small head, wings not so blunt, and longer tail. This specimen contained in its craw some limbs of frogs and many grey snails without shells. The irides of the eyes of this bird were of a beautiful bright yellow colour.

About the tenth of July in the same summer a pair of sparrow-hawks bred in an old crow's nest * on a low beech in the same hanger; and as their brood, which was numerous, began to grow up, became so daring and ravenous, that they were a terror to all the dames in the village that had chickens or ducklings under their care. A boy climbed the tree, and found the young so fledged that they all escaped from him; but discovered that a good house had been kept: the larder was well-stored with provisions; for he brought down a young blackbird, jay, and house-martin, all clean-picked, and some half devoured. The old birds had been observed to make sad havock for some days among the new-flown swallows and martins, which, being but lately out of their nests, had not acquired those powers and command of wing that enable them, when more mature, to set such enemies at defiance.

* This is the invariable practice with this graceful and powerfully active little hawk. In such a nest in the young plantations round his farm, Mr. Durham Weir found the relics of no less than sixteen small birds, under which the young sparrow-hawks were actually being suffocated. The sparrow-hawk lays from three to five eggs, a large brood for a bird of prey.—Ed.

LETTER XCIV.

TO THOMAS PENNANT, ESQ.

EVERY incident that occasions a renewal of our correspondence will ever be pleasing and agreeable to me.

As to the wild wood-pigeon, the *œnas*, or *vinago*, of Ray, I am much of your mind; and see no reason for making it the origin of the common house-dove: but suppose those that have advanced that opinion may have been misled by another appellation, often given to the *œnas*, which is that of stock-dove.

Unless the stock-dove in the winter varies greatly in manners from itself in summer, no species seems more unlikely to be domesticated, and to make an house-dove. We very rarely see the latter settle on trees at all, nor does it ever haunt the woods; but the former, as long as it stays with us, from November perhaps to February, lives the same wild life with the ring-dove, *palumbus torquatus*; frequents coppices and groves, supports itself chiefly by mast, and delights to roost in the tallest beeches. Could it be known in what manner stock-doves build,* the

* Mr. Selby tells us that the Stock-dove (*Columba œnas*), resembles the ring-dove in habit, is a constant inhabitant

doubt would be settled with me at once, provided they construct their nests on trees, like the ring-dove, as I much suspect they do.

You received, you say, last spring a stock-dove from Sussex; and are informed that they sometimes breed in that county. But why did not your correspondent determine the place of its nidification, whether on rocks, cliffs, or trees? If he was not an adroit ornithologist I should doubt the fact, because people with us perpetually confound the stock-dove with the ring-dove.

For my own part, I readily concur with you in supposing that house-doves are derived from the small blue rock-pigeon, *Columba livia*, for many reasons. In the first place the wild stock-dove is manifestly larger than the common house-dove, against the usual rule of domestication, which generally enlarges the breed. Again, those two remarkable black spots on the *remiges* of each wing of the

of woods, breeding in the hollows of old and pollard trees, assembling in flocks, and sometimes associating with the ring-dove. Mr. Yarrell tells us it derives its name of Stock-dove from its habit of building on the stocks of trees, particularly such as have been headed down, and have become rugged and bushy at the top in consequence; and not as some writers have supposed, because it was considered the origin of the domestic pigeon; *C. œnas*, according to Yarrel, indicates the various claret colour of the plumage of the neck.

Mr. M'Gillivray had leisure and opportunity to study the habits of the Rock-pigeon, in the outer Hebrides, among its native rocks, and says, "There can be no reasonable doubt of its being the original of the domestic pigeon. Individuals of the domesticated race which can scarcely be distinguished from the wild race are of common occurrence, and house-pigeons have been known to desert and live with the wild rock-dove. The domestic varieties are innumerable; the blue, the white-backed, the Roman, the Maltese; besides the fancy varieties so highly esteemed for their several distortions and disfigurations.—Ed.

stock-dove, which are so characteristic of the species, would not, one should think, be totally lost by its being reclaimed; but would often break out among its descendants. But what is worth an hundred arguments is, the instance you give in Sir Roger Mostyn's house-doves in Caernarvonshire; which, though tempted by plenty of food and gentle treatment, can never be prevailed on to inhabit their cote for any time; but, as soon as they begin to breed, betake themselves to the fastnesses of Ormshead, and deposit their young in safety amidst the inaccessible caverns, and precipices of that stupendous promontory.* "You may drive nature out with a pitch-fork, but she will always return."

"Naturam expellas furcâ . . . tamen usque recurret."

I have consulted a sportsman, now in his seventy-eighth year, who tells me that fifty or sixty years back, when the beechen woods were much more extensive than at present, the number of wood-pigeons was astonishing; that he has often killed near twenty in a day; and that with a long wild-fowl piece he has shot seven or eight at a time on the wing as they came wheeling over his head: he moreover adds, which I was not aware of, that often there were among them little parties of small blue doves, which he calls rockiers. The food of these numberless emigrants was beechmast and some acorns; and particularly barley, which they collected in the stubbles. But of late years, since the vast increase of turnips, that vegetable has furnished a great part

* The wild rock-pigeon is easily tamed when taken young from the nest, yet it is said to seize the earliest opportunity of rejoining the wild flocks.—Ed.

of their support in hard weather; and the holes they pick in these roots greatly damage the crop. From this food their flesh has contracted a rancidness which occasions them to be rejected by nicer judges of eating, who thought them before a delicate dish. They were shot not only as they were feeding in the fields, and especially in snowy weather, but also at the close of the evening, by men who lay in ambush among the woods and groves to kill them as they came in to roost.* These are the principal circumstances relating to this wonderful internal migration, which with us takes place towards the end of November, and ceases early in the spring. Last winter we had in Selborne high wood about an hundred of these doves; but in former times the flocks were so vast not only with us but all the district round, that on mornings and evenings they traversed the air, like rooks, in strings, reaching for a mile together. When they thus rendezvoused here by thousands, if they happened to be suddenly roused from their roost-trees on an evening,

> "Their rising all at once was like the sound
> Of thunder heard remote."

It will by no means be foreign to the present purpose to add, that I had a relation in this neighbourhood who made it a practice, for a time, whenever he could procure the eggs of a ring-dove, to place them under a pair of doves that were sitting in his own pigeon-house; hoping thereby, if he could bring about a coalition, to enlarge his breed,

* Some old sportsmen say that the main part of these flocks used to withdraw as soon as the heavy Christmas frosts were over.—ED.

and teach his own doves to beat out into the woods and to support themselves by mast: the plan was plausible, but something always interrupted the success; for though the birds were usually hatched, and sometimes grew to half their size, yet none ever arrived at maturity. I myself have seen these foundlings in their nest displaying a strange ferocity of nature, so as scarcely to bear to be looked at, and snapping with their bills by way of menace. In short, they always died, perhaps for want of proper sustenance: but the owner thought that by their fierce and wild demeanour they frighted their foster-mothers, and so were starved.

Virgil, as a familiar occurrence, by way of simile, describes a dove haunting the cavern of a rock in such engaging numbers, that I cannot refrain from quoting the passage:—

"Qualis speluncâ subito commota Columba,
Cui domus, et dulces latebroso in pumice nidi,
Fertur in arva volans, plausumque exterrita pennis
Dat tecto ingentem—mox aere lapsa quieto,
Radit iter liquidum, celeres neque commovet alas."
(VIRG. *Æn.* v. 213—217.)

"As when a dove her rocky hold forsakes,
Roused, in a fright her sounding wings she shakes;
The cavern rings with clattering:—out she flies,
And leaves her callow care, and cleaves the skies:
At first she flutters:—but at length she springs
To smoother flight, and shoots upon her wings."
(DRYDEN'S *Translation.*)

SELBORNE, *Nov.* 30, 1780.

LETTER XCV.

TO THE HONOURABLE DAINES BARRINGTON.

I HAVE now read your miscellanies through with much care and satisfaction; and am to return you my best thanks for the honourable mention made in them of me as a naturalist, which I wish I may deserve.

In some former letters I expressed my suspicions that many of the house-martins do not depart in the winter far from this village. I therefore determined to make some search about the south-east end of the hill, where I imagined they might slumber out the uncomfortable months of winter. But supposing that the examination would be made to the best advantage in the spring, and observing that no martins had appeared by the 11th of April last; on that day I employed some men to explore the shrubs and cavities of the suspected spot. The persons took pains, but without any success; however, a remarkable incident occurred in the midst of our pursuit—while the labourers were at work a house-martin, the first that had been seen this year, came down the village in the sight of several people, and went at once into a nest, where it stayed a short time,

and then flew over the houses; for some days after no martins were observed, not till the 16th of April, and then only a pair. Martins in general were remarkably late this year.

"— — — — daffodils
That come before the swallow dares, and tak
The winds of March with beauty."

SELBORNE, *Sept.* 8, 1781.

LETTER XCVI.

TO THE HONOURABLE DAINES BARRINGTON.

I HAVE just met with a circumstance respecting swifts, which furnishes an exception to the whole tenor of my observations ever since I have bestowed any attention on that species of *hirundines*. Our swifts, in general, withdrew this year about the first day of August, all save one pair, which in two or three days was reduced to a single bird. The perseverance of this individual made me suspect that the strongest of motives, that of an attachment to her young, could alone occasion so late a stay. I watched therefore till the 24th of August, and then discovered that under the eaves of the church, she attended upon two young, which were fledged, and now put out their white chins from a crevice. These remained till the twenty-seventh, looking more alert every day, and seeming to long to be on the wing. After this day they were missing at once; nor could I ever observe them with their dam coursing round the church in the act of learning to fly, as the first broods evidently do. On the thirty-first I caused the eaves to be searched, but we found in the nest only two

callow, dead, stinking swifts, on which a second nest had been formed. This double nest was full of the black shining cases of the *hippoboscæ hirundinis.*

The following remarks on this unusual incident are obvious. The first is, that though it may be disagreeable to swifts to remain beyond the beginning of August, yet that they can subsist longer is undeniable. The second is, that this uncommon event, as it was owing to the loss of the first brood, so it corroborates my former remark, that swifts breed regularly but once; since, was the contrary the case, the occurrence above could neither be new nor rare.

P. S. One swift was seen at Lyndon, in the county of Rutland, in 1782, so late as the third of September.

SELBORNE, *Sept.* 9, 1781.

LETTER XCVII.

TO THE HONOURABLE DAINES BARRINGTON.

AS I have sometimes known you make inquiries about several kinds of insects, I shall here send you an account of one sort which I little expected to have found in this kingdom. I have often observed that one particular part of a vine growing on the walls of my house was covered in the autumn with a black dust-like appearance, on which the flies fed eagerly; and that the shoots and leaves thus affected did not thrive; nor did the fruit ripen. To this substance I applied my glasses; but could not discover that it had anything to do with animal life, as I at first expected: but, upon a closer examination behind the larger boughs, we were surprised to find that they were coated over with husky shells, from whose sides proceeded a cotton-like substance, surrounding a multitude of eggs. This curious and uncommon production put me upon recollecting what I have heard and read concerning the *coccus vitis viniferæ* of Linnæus, which, in the south of Europe, infests many vines, and is an horrid and loathsome pest. As soon as I had turned to the accounts given of

this insect, I saw at once that it swarmed on my vine; and did not appear to have been at all checked by the preceding winter, which had been uncommonly severe.

Not being then at all aware that it had anything to do with England, I was much inclined to think that it came from Gibraltar among the many boxes and packages of plants and birds which I had formerly received from thence; and especially as the vine infested, grew immediately under my study-window, where I usually kept my specimens. True it is that I had received nothing from thence for some years: but as insects are, we know, conveyed from one country to another in a very unexpected manner, and have a wonderful power of maintaining their existence till they fall into a *nidus* proper for their support and increase, I cannot but suspect still that these *cocci* came to me originally from Andalusia. Yet, all the while, candour obliges me to confess that Mr. Lightfoot has written me word that he once, and but once, saw these insects on a vine at Weymouth in Dorsetshire; which, it is here to be observed, is a sea-port town, to which the *coccus* might be conveyed by shipping.

As many of my readers may possibly never have heard of this strange and unusual insect, I shall here transcribe a passage from a natural history of Gibraltar, written by the Reverend John White, late vicar of Blackburn in Lancashire, but not yet published:—

"In the year 1770 a vine which grew on the east side of my house, and which had produced the finest crops of grapes for years past, was suddenly overspread on all the woody branches with large lumps of a white fibrous substance resembling spider's webs,

or rather raw cotton. It was of a very clammy quality, sticking fast to everything that touched it, and capable of being spun into long threads. At first I suspected it to be the product of spiders, but could find none. Nothing was to be seen connected with it but many brown oval husky shells, which by no means looked like insects, but rather resembled bits of the dry bark of the vine. The tree had a plentiful crop of grapes set, when this pest appeared upon it; but the fruit was manifestly injured by this foul incumbrance. It remained all the summer, still increasing, and loaded the woody and bearing branches to a vast degree. I often pulled off great quantities by handfuls: but it was so slimy and tenacious that it could by no means be cleared. The grapes never filled to their natural perfection, but turned watery and vapid. Upon perusing the works afterwards of M. de Reaumur, I found this matter perfectly described and accounted for. Those husky shells, which I had observed, were no other than the female *coccus*, from whose sides this cotton-like substance exudes, and serves as a covering and security for their eggs."*

To this account I think proper to add, that, though the female *cocci* are stationary, and seldom remove

* This troublesome insect rarely survives the winter in the open air, and can therefore scarcely be regarded otherwise than an importation, probably introduced from time to time with new varieties subjected to hot-house culture. It is quite remarkable how these exotic insects get introduced from time to time. The writer once lived next door to a family having West Indian connections, and he soon realized this fact; for a few straggling individuals of a very small red ant soon began to make their appearance in the larder; presently they swarmed and covered everything eatable, and finally they were partly instrumental in driving him from the house.—Ed.

from the place to which they stick, yet the male is a winged insect; and that the black dust which I saw was undoubtedly the excrement of the females, which is eaten by ants as well as flies. Though the utmost severity of our winter did not destroy these insects, yet the attention of the gardener in a summer or two has entirely relieved my vine from this filthy annoyance.

As we have remarked above that insects are often conveyed from one country to another in a very unaccountable manner, I shall here mention an emigration of small *aphides*, which was observed in the village of Selborne no longer ago than August the 1st, 1785.

At about three o'clock in the afternoon of that day, which was very hot, the people of this village were surprised by a shower of *aphides*, or smother-flies, which fell in these parts. Those that were walking in the street at that juncture found themselves covered with these insects, which settled also on the hedges and gardens, blackening all the vegetables where they alighted. My annuals were discoloured with them, and the stalks of a bed of onions were quite coated over for six days after. These armies were then, no doubt, in a state of emigration, and shifting their quarters; and might have come, as far as we know, from the great hop-plantations of Kent or Sussex, the wind being all that day in the easterly quarter. They were observed at the same time in great clouds about Farnham, and all along the vale from Farnham to Alton.*

SELBORNE, *March* 9, 1775.

* For various methods by which several insects shift their quarters, see Derham's Physico-Theology.

LETTER XCVIII.*

TO THE HONOURABLE DAINES BARRINGTON.

WHEN I happen to visit a family where gold and silver fishes are kept in a glass bowl, I am always pleased with the occurrence, because it offers me an opportunity of observing the actions and propensities of those beings with whom I can be little acquainted in their natural state. Not long since I spent a fortnight at the house of a friend where there was such a *vivarium*, to which I paid no small attention, taking every occasion to remark what passed within its narrow limits. It was here that I first observed the manner in which fishes die. As soon as the creature sickens, the head sinks lower and lower, and it stands as it were on its head; till, getting weaker, and losing all poise, the tail turns over, and at last it floats on the surface of the water with its belly uppermost.† The reason why fishes, when

* First published in the Gentleman's Magazine for 1786, under the signature V.

† How much gratified our author would have been had he lived in the present day, when he would see, in the numerous and elegant *vivaria*, how fishes and other aquatic creatures live and enjoy themselves, as well as how they die.—Ed.

dead, swim in that manner is very obvious; because, when the body is no longer balanced by the fins of the belly, the broad muscular back preponderates by its own gravity, and turns the belly uppermost, as lighter from its being a cavity, and because it contains the swimming-bladders, which contribute to render it buoyant. Some that delight in gold and silver fishes have adopted a notion that they need no aliment. True it is that they will subsist for a long time without any apparent food but what they can collect from pure water frequently changed; yet they must draw some support from animalcula, and other nourishment supplied by the water; because, though they seem to eat nothing, yet the consequences of eating often drop from them. That they are best pleased with such *jejune* diet may easily be confuted, since if you toss them crumbs they will seize them with great readiness, not to say greediness: however, bread should be given sparingly, lest, turning sour, it corrupt the water. They will also feed on the water-plant called *lemna* (duck's meat), and also on small fry.

When they want to move a little they gently protrude themselves with their *pinnæ pectorales;* but it is with their strong muscular tails only that they and all fishes shoot along with such inconceivable rapidity. It has been said that the eyes of fishes are immoveable: but these apparently turn them forward or backward in their sockets as their occasions require. They take little notice of a lighted candle, though applied close to their heads, but flounce and seem much frightened by a sudden stroke of the hand against the support whereon the bowl is hung; especially when they have been

motionless, and are perhaps asleep. As fishes have no eyelids, it is not easy to discern when they are sleeping or not, because their eyes are always open. Nothing can be more amusing than a glass bowl containing such fishes: the double refractions of the glass and water represent them, when moving, in a shifting and changeable variety of dimensions, shades, and colours; while the two mediums, assisted by the concavo-convex shape of the vessel, magnify and distort them vastly; not to mention that the introduction of another element and its inhabitants into our parlours engages the fancy in a very agreeable manner.

Gold and silver fishes, though originally natives of China and Japan, yet are become so well reconciled to our climate as to thrive and multiply very fast in our ponds and stews. Linnæus ranks this species of fish under the genus of *cyprinus*, or carp, and calls it *cyprinus auratus*.

Some people exhibit this sort of fish in a very fanciful way; for they cause a glass bowl to be blown with a large hollow space within, that does not communicate with it. In this cavity they put a bird occasionally; so that you may see a goldfinch or a linnet hopping as it were in the midst of the water, and the fishes swimming in a circle round it. The simple exhibition of the fishes is agreeable and pleasant; but in so complicated a way they become whimsical and unnatural, and liable to the objection due to him,—"who loves to vary every single thing prodigiously"—

> "Qui variare cupit rem prodigialitèr unam."
> (Hor. *Ars. Poet.* 29.)

LETTER XCIX.

TO THE HONOURABLE DAINES BARRINGTON.

I THINK I have observed before, that much the most considerable part of the house-martins withdraw from hence about the first week in October; but that some, the latter broods I am now convinced, linger on till towards the middle of that month: and that at times, once perhaps in two or three years, a flight, for one day only, has shown itself in the first week in November.

Having taken notice, in October 1780, that the last flight was numerous, amounting perhaps to one hundred and fifty; and that the season was soft and still; I was resolved to pay uncommon attention to these late birds; to find, if possible, where they roosted, and to determine the precise time of their retreat. The mode of life of these latter *hirundines* is very favourable to such a design; for they spend the whole day in the sheltered district, between me and the Hanger, sailing about in a placid, easy manner, and feasting on those insects which love to haunt a spot so secure from ruffling winds. As my principal object was to discover the place of their roosting, I took care to wait on them before they retired to rest, and was much pleased to find that,

for several evenings together, just at a quarter past five in the afternoon, they all scudded away in great haste towards the south-east, and darted down among the low shrubs above the cottages at the end of the hill. This spot in many respects seems to be well calculated for their winter residence:* for in many parts it is as steep as the roof of any house, and therefore secure from the annoyances of water; and it is moreover clothed with beechen shrubs,

* It is quite curious to remark the tenacity with which White clings to this idea. Our extensive knowledge of southern latitudes not only reveals to us the fact of their migration, but the localities to which they resort. Even as high as Ceylon the swallow is an annual visitant. Leaving him to his harmless fancy, perhaps the reader would like to know something more of the swallow and its ways before we part with it. Ælian, Plutarch, and Pliny class it with the fly, the rat, and the mouse; among animals which cannot be tamed. Modern perseverance has been more successful with the swallow at least. The Rev. Walter Trevelyan in a letter to the editor of Bewick's "Birds," describes how he succeeded in taming one in 1800. "About nine weeks ago," he says, "a swallow, newly fledged, fell down one of our chimneys. It was able to fly in three days. In a few days the children took him into the fields with them, and as each child found a fly and whistled, the bird flew for his prey from one to another, at other times he would fly about them in the air, but always descending at the first call, in spite of the constant endeavours of wild swallows to seduce him away. Our little inmate was now made a prisoner by being put into a cage, but ranged at large in the room occupied by the children, sitting on their heads or hands, and catching flies for himself. At length supplies of food running short—for he required from 700 to 1000 flies a day—he was turned out of the house to cater for himself; but he continued no less tame, answering their call, and coming in at the window to the children every day, and roosting on the head of one of them until he was put away for the night." At last it was necessary to alienate him from his little friends. He was absent for four days; he became less tame; the whistle did not bring him to the hand; and his period of domestication approached its termination, for the good pastor was fearful it might be left behind at the general migration.—Ed.

which, being stunted and bitten by sheep, make the thickest covert imaginable; they are so entangled as to be impervious to the smallest spaniel: besides, it is the nature of underwood beech, never to cast its leaf all the winter; so that, with the leaves on the ground and those on the twigs, no shelter can be more complete. I watched them on to the thirteenth and fourteenth of October, and found their evening retreat was exact and uniform; but after this they made no regular appearance. Now and then a straggler was seen; and on the twenty-second of October, in the morning I observed two over the village, and with them my remarks for the season ended.

From all these circumstances put together, it is more than probable that this lingering flight, at so late a season of the year, never departed from the island. Had they indulged me that autumn with a November visit, as I much desired, I presume that, with proper assistants, I should have settled the matter past all doubt; but though the third of November was a sweet day, and in appearance exactly suited to my wishes, yet not a martin was to be seen; and so I was forced, reluctantly, to give up the pursuit.

I have only to add, that, were the bushes, which cover some acres, and are not my own property, to be grubbed and carefully examined, probably those late broods, and perhaps the whole aggregate body of the house-martins of this district, might be found there, in different secret dormitories; and that, so far from withdrawing into warmer climes, it would appear that they never depart three hundred yards from the village.

October 10, 1781.

LETTER C.

TO THE HONOURABLE DAINES BARRINGTON.

THEY who write on natural history cannot too frequently advert to instinct, that wonderful, but limited faculty, which, in some instances, raises the brute creation as it were above reason, and in others leaves them so far below it. Philosophers have defined instinct to be that secret influence by which every species is impelled naturally to pursue, at all times, the same way or track, without any teaching or example; whereas reason, without instruction, would lead them to do that by many methods which instinct effects by one alone. Now this maxim must be taken in a qualified sense; for there are instances in which instinct does vary and conform to the circumstances of place and convenience.

It has been remarked that every species of bird has a mode of nidification peculiar to itself; so that a school-boy would at once pronounce on the sort of nest before him. This is the case among fields and woods, and wilds; but, in the villages round London, where mosses and gossamer, and cotton from vegetables, are hardly to be found, the nest of the

chaffinch has not that elegant finished appearance, nor is it so beautifully studded with lichens, as in a more rural district: and the wren is obliged to construct its house with straws and dry grasses, which do not give it that rotundity and compactness so remarkable in the edifices of that little architect. Again, the regular nest of the house-martin is hemispheric; but where a rafter, or a joist, or a cornice, may happen to stand in the way, the nest is so contrived as to conform to the obstruction, and becomes flat or oval, or compressed.

In the following instances instinct is perfectly uniform and consistent. There are three creatures, the squirrel, the field-mouse, and the bird called the nut-hatch (*sitta Europæa*), which live much on hazel-nuts; and yet they open them each in a different way. The first, after rasping off the small end, splits the shell in two with his long fore-teeth, as a man does with his knife; the second nibbles a hole with his teeth, as regular as if drilled with a wimble, and yet so small that one would wonder how the kernel can be extracted through it; while the last picks an irregular ragged hole with its bill: but as this artist has no paws to hold the nut firm while he pierces it, like an adroit workman, he fixes it, as it were in a vice, in some cleft of a tree, or in some crevice: when, standing over it, he perforates the stubborn shell. We have often placed nuts in the chink of a gate-post where nut-hatches have been known to haunt, and have always found that those birds have readily penetrated them. While at work they make a rapping noise that may be heard at a considerable distance.

You that understand both the theory and practical

part of music may best inform us why harmony or melody should so strangely affect some men, as it were by recollection, for days after a concert is over. What I mean the following passage will explain:—

"Præhabebat porrò vocibus humanis, instrumentisque harmonicis musicam illam avium: non quod aliâ quoque non delectaretur; sed quod ex musicâ humanâ relinqueretur in animo continens quædam, attentionemque et somnum conturbans agitatio; dum ascensus, exscensus, tenores, ac mutationes illæ sonorum, et consonantiarum euntque, redeuntque per phantasiam:—cum nihil tale relinqui possit ex modulationibus avium, quæ, quod non sunt perinde a nobis imitabiles, non possunt perinde internam facultatem commovere."—*Gassendus.**

This curious quotation strikes me much by so well representing my own case, and by describing what I have so often felt, but never could so well express. When I hear fine music I am haunted with passages therefrom night and day; and especially at first waking, which, by their importunity, give me more uneasiness than pleasure: elegant lessons still tease my imagination, and recur irresistibly to my recollection at seasons, and even when I am desirous of thinking of more serious matters.

* "He preferred the music of birds to vocal and instrumental harmony, not that he did not take pleasure in any other, but because the latter left in the mind some constant agitation, disturbing the sleep and the attention; whilst the several variations of sound and concord go and return through the imagination; whereas no such effect can be produced by the modulation of birds, because, as they are not equally imitable by us, they cannot equally excite the internal faculty."
Gassendus, in the Life of Peireso.

LETTER CI.

TO THE HONOURABLE DAINES BARRINGTON.

A RARE, and I think a new, little bird frequents my garden, which I have great reason to think is the pettichaps:* it is common in some parts of the kingdom; and I have received formerly several dead specimens from Gibraltar. This bird much resembles the white-throat, but has a more white or rather silvery breast and belly; is restless and active, like the willow-wrens, and hops from bough to bough, examining every part for food; it also runs up the stems of the crown-imperials, and, putting its head into the bells of those flowers, sips the liquor which stands in the *nectarium* of each petal. Sometimes it feeds on the ground, like the hedge-sparrow, hopping about on the grass-plots and mown walks.

One of my neighbours, an intelligent and observing man, informs me, that, in the beginning of May, and about ten minutes before eight o'clock in the evening,

* Lesser White-throat, (*Sylvia curruca*, Temm.,) and not the pettichaps; the song is very sweet and more perfect in its notes than the white-throat: it is shy, wary, and even petulant in avoiding intruders.

he discovered a great cluster of house-swallows, thirty at least, he supposes, perching on a willow that hung over James Knight's upper-pond. His attention was first drawn by the twittering of these birds, which sat motionless in a row on the bough, with their heads all one way, and by their weight, pressing down the twig so that it nearly touched the water. In this situation he watched them till he could see no longer. Repeated accounts of this sort, in spring and fall, induce me greatly to suspect that house-swallows have some strong attachment to water, independent of the matter of food; and, though they may not retire into that element, yet they may conceal themselves in the banks of pools and rivers during the uncomfortable months of winter.

One of the keepers of Wolmer-forest sent me a peregrine-falcon, which he shot on the verge of that district, as it was devouring a wood-pigeon. The *falco peregrinus*, or haggard falcon, is a noble species of hawk seldom seen in the southern counties. In winter 1767 one was killed in the neighbouring parish of Farringdon, and sent by me to Mr. Pennant into North-Wales.* Since that time I have met with none till now. The specimen mentioned above was in fine preservation, and not injured by the shot: it measured forty-two inches from wing to wing, and twenty-one from beak to tail, and weighed two pounds and a half standard weight. This species is very robust, and wonderfully formed for rapine: its breast was plump and muscular; its thighs long, thick, and brawny; and its legs re-

* See my tenth and eleventh Letters, pages 43 and 46.

markably short and well set: the feet were armed with most formidable, sharp, long talons: the eyelids and cere of the bill were yellow; but the irides of the eyes dusky; the beak was thick and hooked, and of a dark colour, and had a jagged process near the end of the upper mandible on each side: its tail, or train, was short in proportion to the bulk of its body: yet the wings, when closed, did not extend to the end of the train. From its large and fair proportions it might be supposed to have been a female; but I was not permitted to cut open the specimen. For one of the birds of prey, which are usually lean, this was in high case: in its craw were many barley-corns, which probably came from the crop of the wood-pigeon, on which it was feeding when shot: for voracious birds do not eat grain;* but, when devouring their quarry, with undistinguishing vehemence they swallow bones and feathers, and all matters, indiscriminately. This falcon was probably driven from the mountains of North-Wales or Scotland, where they are known to breed, by rigorous weather and the deep snows that had lately fallen.

* Spallanzani pursued a series of experiments which satisfied him that the falcons could be brought to live on grain; but their structure and talons certainly lead to other conclusions.—ED.

LETTER CII.

TO THE HONOURABLE DAINES BARRINGTON.

MY near neighbour, a young gentleman in the service of the East India Company, has brought home a dog and a bitch of the Chinese breed from Canton; such as are fattened in that country for the purpose of being eaten: they are about the size of a moderate spaniel; of a pale yellow colour, with coarse bristling hairs on their backs; sharp upright ears, and peaked heads, which give them a very fox-like appearance. Their hind legs are unusually straight, without any bend at the hock or ham, to such a degree as to give them an awkward gait when they trot. When they are in motion, their tails are curved high over their backs like those of some hounds, they have a bare place each on the outside from the tip midway, that does not seem to be matter of accident, but is somewhat singular. Their eyes are jet-black, small, and piercing; the insides of their lips and mouths of the same colour, and their tongues blue. The bitch has a dew-claw on each hind leg; the dog has none. When taken out into a field, the bitch showed some disposition for hunting, and dwelt on the scent of a

covey of partridges, till she sprung them, giving tongue all the time. The dogs in South America are dumb; but these bark much in a short thick manner, like foxes; and have a surly, savage demeanor like their ancestors, which are not domesticated, but bred up in sties, where they are fed for the table, with rice-meal, and other farinaceous food. These dogs, having been taken on board as soon as weaned, could not learn much from their dam; yet they did not relish flesh when they came to England. In the islands of the Pacific Ocean, the dogs are bred up on vegetables, and would not eat flesh when offered them by our circumnavigators.

We believe that all dogs, in a state of nature, have sharp, upright fox-like ears; and that hanging ears, which are esteemed so graceful, are the effect of choice breeding and cultivation. Thus, in the travels of Ysbrandt Ides from Muscovy to China, the dogs which draw the Tartars on snow-sledges near the river Obey are engraved with prick-ears, like those from Canton. The Kamschatdales also train the same sort of sharp-eared peaked-nosed dogs to draw their sledges; as may be seen in an elegant print engraved for Captain Cook's last voyage round the world.

Now we are upon the subject of dogs, it may not be impertinent to add, that Spaniels, as all sportsmen know, though they hunt partridges and pheasants as it were by instinct, and with much delight and alacrity, yet will hardly touch their bones when offered as food; nor will a mongrel dog of my own, though he is remarkable for finding that sort of game. But, when we came to offer the bones of partridges to the two Chinese dogs, they devoured them with much greediness, and licked the platter clean.

No sporting dog will flush woodcocks till inured to the scent and trained to the sport, which they then pursue with vehemence and transport; but then they will not touch their bones, but turn from them with abhorrence, even when they are hungry.

Now, that dogs should not be fond of the bones of such birds as they are not disposed to hunt is no wonder; but why they reject, and do not care to eat their natural game, is not so easily accounted for, since the end of hunting seems to be, that the chase pursued should be eaten. Dogs again will not devour the more rancid water-fowls, nor indeed the bones of any wild fowl; nor will they touch the fœtid bodies of birds that feed on offal and garbage: and indeed there may be somewhat of providential instinct in this circumstance of dislike; for vultures,* and kites, and ravens, and crows, &c. were intended to be mess-mates with dogs over their carrion; and seem to be appointed by Nature as fellow-scavengers to remove all cadaverous nuisances from the face of the earth.

SELBORNE.

* Hasselquist, in his "Travels to the Levant," observes that the dogs and vultures at Grand Cairo maintain such a friendly intercourse as to bring up their young together in the same place.

LETTER CIII.

TO THE HONOURABLE DAINES BARRINGTON.

THE fossil wood buried in the bogs of Wolmer-forest is not yet all exhausted, for the peat-cutters now and then stumble upon a log. I have just seen a piece which was sent by a labourer of Oakhanger to a carpenter of this village; this was the butt-end of a small oak, about five feet long, and about five inches in diameter. It had apparently been severed from the ground by an axe, was very ponderous, and as black as ebony. Upon asking the carpenter for what purpose he had procured it; he told me that it was to be sent to his brother, a joiner at Farnham, who was to make use of it in cabinet work, by inlaying it along with whiter woods.

Those that are much abroad on evenings after it is dark, in spring and summer, frequently hear a nocturnal bird passing by on the wing, and repeating often a short quick note. This bird I have remarked myself, but never could make out till lately. I am assured now that it is the Stone-curlew (*charadrius oedicnemus*). Some of them pass over or near my house, almost every evening after it is dark: from

the uplands of the hill and North field, away down towards Dorton; where, among the streams and meadows, they find a greater plenty of food. Birds that fly by night are obliged to be noisy; their notes often repeated become signals or watch-words to keep them together, that they may not stray or lose each other in the dark.

The evening proceedings and manœuvres of rooks, are curious and amusing in the autumn. Just before dusk they return in long strings from the foraging of the day, and rendezvous by thousands over Selborne-down, where they wheel round in the air, and sport, and dive, in a playful manner, all the while exerting their voices, and making a loud cawing, which, being blended and softened by the distance that we at the village are below them, becomes a confused noise or chiding; or rather a pleasing murmur, very engaging to the imagination, and not unlike the cry of a pack of hounds in hollow, echoing woods; or the rushing of the wind in tall trees,* or the tumbling of the tide upon a pebbly

* They usually select for their breeding-place, a cluster of tall trees, in the neighbourhood of some old mansion-house, to which they have attached themselves.

"— — Sable tenants of five hundred years,
That on the high tops of yon ancient elms
Pour their hoarse music on the lonely ear."

These nests, where the trees are not numerous, are sometimes crowded in masses, as many as five or six and twenty, on three or four large trees. M'Gillivray visited a rookery at night, and was surprised, when four hundred yards distant, to hear the rooks uttering a variety of soft, clear, modulated notes, very unlike their usual cry. As he approached he perceived the male birds perched on the twigs in great numbers. Presently a loud croak from a distance gave warning to the whole community, when they removed, but with much less clamour than would have been used during the day.—ED.

shore. When this ceremony is over, with the last gleam of day, they retire for the night to the deep beechen woods of Tisted and Ropley. We remember a little girl who, as she was going to bed, used to remark on such an occurrence, in the true spirit of physico-theology, that the rooks were saying their prayers; and yet this child was much too young to be aware that the Scriptures have said of the Deity —that "He feedeth the ravens who call upon him."

LETTER CIV.

TO THE HONOURABLE DAINES BARRINGTON.

IN reading Dr. Huxham's *Observationes de Aëre*, &c. written at Plymouth, I find by those curious and accurate remarks, which contain an account of the weather from the year 1727 to the year 1748, inclusive; that though there is frequent rain in that district of Devonshire, yet the quantity falling is not great; and that some years it has been very small: for in 1731 the rain measured only 17^{inch}.—266^{thou}. and in 1741, 20—354; and again in 1743 only 20—908. Places near the sea have frequent scuds, that keep the atmosphere moist, yet do not reach far up into the country; making thus the maritime situations appear wet, when the rain is not considerable. In the wettest years at Plymouth, the Doctor measured only once 36; and again once, viz. 1734, 37—114: a quantity of rain that has twice been exceeded at Selborne in the short period of my observations. Dr. Huxham remarks, that frequent small rains keep the air moist; while heavy ones render it more dry, by beating down the vapours. He is also of opinion that the dingy, smoky appearance in the sky, in

very dry seasons, arises from the want of moisture sufficient to let the light through, and render the atmosphere transparent; because he had observed several bodies more diaphanous when wet than dry; and never recollected that the air had that look in rainy seasons.

My friend, who lives just beyond the top of the down, brought his three swivel guns to try them in my outlet, with their muzzles towards the Hanger, supposing that the report would have had a great effect; but the experiment did not answer his expectation. He then removed them to the Alcove on the Hanger; when the sound, rushing along the Lythe and Combwood, was very grand: but it was at the Hermitage that the echoes and repercussions most delighted the hearers; not only filling the Lythe with the roar, as if all the beeches were tearing up by the roots; but, turning to the left, they pervaded the vale above Combwood-ponds; and after a pause seemed to take up the crash again, and to extend round Harteley-hangers, dying away at last among the coppices and coverts of Ward le ham. It has been remarked before that this district is an *anathoth*, a place of responses or echoes, and therefore proper for such experiments: we may farther add that the pauses in echoes, when they cease and yet are taken up again, like the pauses in music, surprise the hearers, and have a fine effect on the imagination.

The gentleman above mentioned has just fixed a barometer in his parlour at Newton Valence. The tube was first filled here (at Selborne) twice with care, when the mercury agreed and stood exactly with my own; but, being filled again twice at Newton, the mercury stood, on account of the great

elevation of that house, three-tenths of an inch lower than the barometers at this village, and so it continues to do, be the weight of the atmosphere what it may. The plate of the barometer at Newton is figured as low as 27; because in stormy weather the mercury there will sometimes descend below 28. We have supposed Newton-house to stand two hundred feet higher than this house: but if the rule holds good, which says that mercury in a barometer sinks one-tenth of an inch for every hundred feet elevation, then the Newton barometer, by standing three-tenths lower than that of Selborne, proves that Newton-house must be three hundred feet higher than that in which I am writing, instead of two hundred.

It may not be impertinent to add, that the barometers at Selborne stand three-tenths of an inch lower than the barometers at South Lambeth; whence we may conclude that the former place is about three hundred feet higher than the latter; and with good reason, because the streams that rise with us run into the Thames at Weybridge, and so to London. Of course therefore there must be lower ground all the way from Selborne to South Lambeth; the distance between which, all the windings and indentings of the streams considered, cannot be less than a hundred miles.

LETTER CV.

TO THE HONOURABLE DAINES BARRINGTON.

SINCE the weather of a district is undoubtedly part of its natural history, I shall make no further apology for the four following letters, which will contain many particulars concerning some of the great frosts and a few respecting some very hot summers, that have distinguished themselves from the rest during the course of my observations.

As the frost in January 1768 was, for the small time it lasted, the most severe that we had then known for many years, and was remarkably injurious to ever-greens; some account of its rigour, and reason of its ravages, may be useful, and not unacceptable to persons that delight in planting and ornamenting; and may particularly become a work that professes never to lose sight of utility.

For the last two or three days of the former year, there were considerable falls of snow, which lay deep and uniform on the ground, without any drifting; wrapping up the more humble vegetation in perfect security. From the first day to the fifth of the new year, more snow succeeded; but from that day the

air became entirely clear; and the heat of the sun about noon, had considerable influence in sheltered situations.

It was in such an aspect that the snow on the author's ever-greens was melted every day, and frozen intensely every night; so that the laurustines, bays, laurels, and arbutuses looked, in three or four days, as if they had been burnt in the fire; while a neighbour's plantation of the same kind, in a high cold situation, where the snow never melted at all, remained uninjured.

From hence I would infer that it is the repeated melting and freezing of the snow that is so fatal to vegetation, rather than the severity of the cold. Therefore it highly behoves every planter, who wishes to escape the cruel mortification of losing in a few days, the labour and hopes of years, to bestir himself on such emergencies; and, if his plantations are small, to avail himself of mats, cloths, pease-haum, straw, reeds, or any such covering, for a short time; or, if his shrubberies are extensive, to see that his people go about with prongs and forks, and carefully dislodge the snow from the boughs: since the naked foliage will shift much better for itself, than where the snow is partly melted and frozen again.

It may perhaps appear at first like a paradox; but doubtless the more tender trees and shrubs should never be planted in hot aspects; not only for the reason assigned above, but also because, thus circumstanced, they are disposed to shoot earlier in the spring, and to grow on later in the autumn, than they would otherwise do, and so are sufferers by lagging or early frosts. For this reason also, plant

from Siberia will hardly endure our climate: because, on the very first advances of spring, they shoot away, and so are cut off by the severe nights of March or April.

Dr. Fothergill and others have experienced the same inconvenience with respect to the more tender shrubs from North-America; which they therefore plant under north-walls. There should also, perhaps, be a wall to the east, to defend them from the piercing blasts from that quarter.

This observation might without any impropriety be carried into animal life; for discerning bee-masters now find that their hives should not in the winter be exposed to the hot sun, because such unseasonable warmth, awakens the inhabitants too early from their slumbers; and, by putting their juices into motion too soon, subjects them afterwards to inconveniences, when rigorous weather returns.

The coincidents attending this short but intense frost, were, that the horses fell sick with an epidemic distemper, which injured the wind of many, and killed some; that colds and coughs were general among the human species; that it froze under people's beds for several nights; that meat was frozen so hard that it could not be spitted, and could not be secured but in cellars; that several redwings and thrushes were killed by the frost; and that the large titmouse continued to pull straws lengthwise from the eaves of thatched houses and barns in a most adroit manner, for a purpose that has been explained already.*

On the 3rd of January, Benjamin Martin's thermometer within doors, in a close parlour where there

* See Letter LXI. to Mr. Pennant, page 251.

was no fire, fell in the night to 20, and on the 4th to 18, and on the 7th to 17½, a degree of cold which the owner never observed in the same situation; and he regrets much that he was not able at that juncture to attend his instrument abroad. All this time the wind continued north and north-east; and yet on the 8th roost-cocks, which had been silent, began to sound their clarions, and crow with clamour, as prognostic of milder weather; moles also began to heave and work, and a manifest thaw took place. From the latter circumstance we may conclude that thaws often originate under ground from warm vapours which arise; else how should subterraneous animals receive such early intimations of their approach. Moreover, we have often observed that cold seems to descend from above; for, when a thermometer hangs abroad in a frosty night, the intervention of a cloud* shall immediately raise the mercury ten degrees; and a clear sky shall again compel it to descend to its former gage.

* The cloud of vapour indicates increased radiation of heat and consequent evaporation where it occurs; as the clear sky is indicative of their absence. The following figures represent the temperature in the open air, at one foot and at two feet under ground, the top figures representing the months, those below, the mean average of each during the ten years.

	1	2	3	4	5	6	7	8	9	10	11	12
1 ft.	40·07	39· 4	40·90	46·47	53·11	60·02	62·85	61·80	57·54	51·13	46·05	41·13
2 ft.	41·0	40· 1	41·59	46·25	52·01	58·47	61·71	61·26	57·89	52·79	47.28	42·83
Air	38·2	38· 1	40·49	46·57	53·34	60·45	63·40	61·28	56·14	49·35	42·89	38·14

It thus appears that the temperature at two feet below the surface is 2° 33′ higher than in the air in January; 1° 70′ in February; 0·77′ in March; 0·25′ in August; 1° 57′ in September; 2° 80′ in October; 3° 75′ in November; and 3° 84′ in December. On the other hand, the temperature is higher by 0·21′ in the open air in April; 0·98′ in May; 1° 21′ in June; and 1° 12′ in July.

And here it may be proper to observe, on what has been said above, that though frosts advance to their utmost severity by somewhat of a regular gradation, yet thaws do not usually come on by so regular a declension of cold; but often take place immediately after intense freezing; as men in sickness often mend at once from a paroxysm.

To the great credit of Portugal laurels and American junipers, be it remembered, that they remained untouched amidst the general havock: hence men should learn to ornament chiefly with such trees as are able to withstand accidental severities, and not subject themselves to the vexation of a loss which may befall them, once, perhaps, in ten years, yet may hardly be recovered through the whole course of their lives.

As it afterwards appeared, the ilexes were much injured, the cypresses were half destroyed, the arbutuses lingered on, but never recovered; and the bays, laurustines, and laurels, were killed to the ground, and the very wild hollies, in hot aspects; were so much affected that they cast all their leaves.

By the fourteenth of January the snow was entirely gone; the turnips emerged not damaged at all, save in sunny places; the wheat looked delicate, and the garden plants were well preserved; for snow is the most kindly mantle that infant vegetation can be wrapped in; were it not for that friendly meteor, no vegetable life could exist at all, in northerly regions. Yet in Sweden, the earth, in April is not divested of snow for more than a fortnight, before the face of the country is covered with flowers.

LETTER CVI.

TO THE HONOURABLE DAINES BARRINGTON.

THERE were some circumstances attending the remarkable frost in January 1776, so singular and striking, that a short detail of them may not be unacceptable.

The most certain way to be exact, will be to copy the passages from my journal, which were taken from time to time as things occurred. But it may be proper, previously to remark, that the first week in January was uncommonly wet, and drowned with vast rains from every quarter: from whence it may be inferred, as there is great reason to believe is the case, that intense frosts seldom take place till the earth is perfectly glutted and chilled with water;* and hence dry autumns are seldom followed by rigorous winters.

January 7th.—Snow driving all the day, which was followed by frost, sleet, and some snow, till the

* The autumn preceding January 1768 was very wet, and particularly the month of September, during which there fell at Lyndon, in the county of Rutland, six inches and an half of rain. And the terrible long frost in 1739-40 set in after a rainy season, and when the springs were very high.

12th, when a prodigious mass overwhelmed all the works of men, drifting over the tops of the gates, and filling the hollow lanes.

On the 14th the writer was obliged to be much abroad; and thinks he never, before or since, has encountered such rugged Siberian weather. Many of the narrow roads were now filled above the tops of the hedges; through which the snow was driven into most romantic and grotesque shapes, so striking to the imagination, as not to be seen without wonder and pleasure. The poultry dared not to stir out of their roosting places; for cocks and hens are so dazzled and confounded by the glare of snow that they would soon perish without assistance. The hares also lay sullenly in their seats, and would not move till compelled by hunger; being conscious, poor animals, that the drifts and heaps treacherously betray their footsteps, and prove fatal to numbers of them.

From the 14th the snow continued to increase, and began to stop the road waggons, and coaches, which could no longer keep on their regular stages: more especially on the western roads, where the fall appears to have been deeper than in the south. The company at Bath, that wanted to attend the Queen's birth-day, were strangely incommoded: the carriages of many persons, who got in their way to town from Bath as far as Marlborough, after strange embarrassments, here met with a *ne plus ultra*. The ladies fretted, and offered large rewards to labourers if they would shovel them a track to London: but the relentless heaps of snow were too bulky to be removed; and so the 18th passed over, leaving the company in very uncomfortable circumstances at the Castle and other inns.

On the 20th the sun shone out for the first time since the frost began; a circumstance that has been remarked on before as much in favour of vegetation. All this time the cold was not very intense, for the thermometer stood at 29, 28, 25, and thereabout: but on the 21st it descended to 20. The birds now began to be in a very pitiable and starving condition. Tamed by the season, sky-larks settled in the streets of towns, because they saw the ground was bare; rooks frequented dunghills close to houses; and crows watched horses as they passed, and greedily devoured what dropped from them; hares now came into the gardens, and, scraping away the snow, devoured such plants as they could find.

On the 22nd the author had occasion to go to London through a sort of Laplandian scene, very wild and grotesque indeed. But the metropolis itself exhibited a still more singular appearance than the country; for, being bedded deep in snow, the pavement of the streets could not be touched by the wheels or the horses' feet, so that the carriages ran about without the least noise. Such an exemption from din and clatter was strange, but not pleasant; it seemed to convey an uncomfortable idea of desolation:

" — — — — — — ipsa silentia terrent."

" By silence terrified."

On the 27th much snow fell all day, and in the evening the frost became very intense. At South Lambeth, for the four following nights, the thermometer fell to 11, 7, 6, 6; and at Selborne to 7, 6, 10; and on the 31st of January, just before sunrise, with rime on the trees and on the tube of the

glass, the quicksilver sunk exactly to zero, being 32 degrees below the freezing point: but by eleven in the morning, though in the shade, it sprung up to 16½ *—a most unusual degree of cold this for the south of England! During these four nights the cold was so penetrating, that it occasioned ice in warm chambers, and under beds; and in the day, the wind was so keen, that persons of robust constitutions could scarcely endure to face it. The Thames was at once frozen over both above and below bridge so that crowds ran about on the ice. The streets were now strangely incumbered with snow, which crumbled and trod dusty; and, soon turning grey, resembled bay-salt: what had fallen on the roofs, was perfectly dry, that, from first to last, it lay twenty-six days on the houses in the city; a longer time than had been remembered by the oldest housekeepers living. According to all appearances, we might now have expected the continuance of this rigorous weather for weeks to come, since every night increased in severity; but behold, without any apparent cause, on the 1st of February a thaw took place, and some rain followed before night, making good the observation above, that frosts often go off as it were at once, without any gradual declension of cold. On the 2nd of February the thaw persisted; and on the 3rd swarms of little insects were frisking and sporting in a court-yard at South Lam-

* At Selborne, the cold was greater than at any other place that the author could hear of with certainty: though it was reported at the time, that, at a village in Kent, the thermometer fell two degrees below zero, viz. 34 degrees below the freezing point.

The thermometer used at Selborne was graduated by Benjamin Martin.

beth, as if they had felt no frost. Why the juices in the small bodies, and smaller limbs, of such minute beings are not frozen: is a matter of curious inquiry.

Severe frosts seem to be partial, or to run in currents; for, at the same juncture, as the author was informed by accurate correspondents, at Lyndon in the county of Rutland, the thermometer stood at 19: at Blackburn, in Lancashire, at 19: and at Manchester at 21, 20, and 18. Thus does some unknown circumstance strangely overbalance latitude, and render the cold sometimes much greater in the southern than the northern parts of this kingdom.

The consequences of this severity were, that in Hampshire, at the melting of the snow, the wheat looked well, and the turnips came forth little injured. The laurels and laurustines were somewhat damaged, but only in hot aspects. No evergreens were quite destroyed; and not half the damage sustained that befell in January 1768. Those laurels that were a little scorched on the south-sides, were perfectly untouched on their north-sides. The care taken to shake the snow day by day from the branches seemed greatly to avail the author's evergreens. A neighbour's laurel-hedge, in a high situation, and facing to the north, was perfectly green and vigorous; and the Portugal laurels remained unhurt.

As to the birds; the thrushes and blackbirds were mostly destroyed; and the partridges were so thinned by the weather and poachers, that few remained to breed the following year.

LETTER CVII.

TO THE HONOURABLE DAINES BARRINGTON.

AS the frost in December 1784 was very extraordinary, you, I trust, will not be displeased to hear the particulars; and especially when I promise to say no more about the severities of winter after I have finished this letter.

The first week in December was very wet, with the barometer very low. On the 7th, with the barometer at 28—five tenths, came on a vast snow, which continued all that day and the next, and most part of the following night; so that by the morning of the 9th the works of men were quite overwhelmed, the lanes filled so as to be impassable, and the ground covered twelve or fifteen inches without any drifting. In the evening of the 9th, the air began to be so very sharp, that we thought it would be curious to attend to the motions of a thermometer: we therefore hung out two; one made by Martin and one by Dollond, which soon began to show us what we were to expect; for, by ten o'clock, they fell to 21, and at eleven to 4, when we went to bed. On the 10th, in the morning, the quicksilver of Dollond's glass was

down to half a degree below zero; and that of Martin's, which was absurdly graduated only to four degrees above zero, sunk quite into the brass guard of the ball; so that when the weather became most interesting, this was useless. On the 10th, at eleven at night, though the air was perfectly still, Dollond's glass went down to one degree below zero! This strange severity of the weather made me very desirous to know what degree of cold there might be in such an exalted and near situation as Newton. We had therefore, on the morning of the 10th, written to Mr. ——, and entreated him to hang out his thermometer, made by Adams; and to pay some attention to it morning, and evening; expecting wonderful phænomena, in so elevated a region as two hundred feet or more above my house. But, behold! on the 10th, at eleven at night, it was down only to 17°, and the next morning at 22°, when mine was at 10°! We were so disturbed at this unexpected reverse of comparative local cold, that we sent one of my glasses up, thinking that of Mr. —— must, some how, be wrongly constructed. But, when the instruments came to be confronted, they went exactly together: so that, for one night at least, the cold at Newton was 18° less than at Selborne; and, through the whole frost 10° or 12°; indeed, when we came to observe the consequences, we could readily credit this; for all my laurustines, bays, ilexes, arbutuses, cypresses, and even my Portugal laurels,* and (which occasions more regret) my fine

* Mr. Miller, in his "Gardener's Dictionary," says positively that the Portugal laurels remained uninjured in the remarkable frost of 1739-40. So that either that accurate observer was much mistaken, or else the frost of December

sloping laurel-hedge, were scorched up; while, at Newton, the same trees had not lost a leaf!

We had steady frost on to the 25th, when the thermometer in the morning was down to 10° with us, and at Newton only to 21. Strong frost continued till the 31st, when some tendency to thaw was observed; and, by January the 3rd, 1785, the thaw was confirmed, and some rain fell.

A circumstance that I must not omit, because it was new to us, is, that on Friday, December the 10th, being bright sunshine, the air was full of icy spiculæ, floating in all directions, like atoms in a sun-beam let into a dark room. We thought them, at first, particles of the rime falling from my tall hedges; but were soon convinced to the contrary, by making our observations in open places where no rime could reach us. Were they watery particles of the air frozen as they floated; or were they evaporations from the snow frozen as they mounted?

We were much obliged to the thermometers for the early information they gave us; and hurried our apples, pears, onions, &c. into the cellar, and warm closets; while those who had not such warnings, or neglected them, lost all their stores of roots and fruits, and had their very bread and cheese frozen.

I must not omit to tell you, that, during those two Siberian days, my parlour-cat was so electric, that had a person stroked her, and been properly insulated, the shock might have been given to a whole circle of people.

I forgot to mention before, that, during the two

1784 was much more severe and destructive than that in the year above-mentioned. This, however, would depend more upon the absence of damp than on the actual degree of cold. —Ed.

severe days, two men, who were tracking hares in the snow, had their feet frozen; and two others, who were much better employed, had their fingers so affected by the frost, while they were thrashing in a barn, that a mortification followed, from which they did not recover for many weeks.

This frost killed all the furze and most of the ivy, and in many places stripped the hollies of all their leaves. It came at a very early time of the year, before old November ended; and yet may be allowed from its effects to have exceeded any since 1739-40.

LETTER CVIII.

TO THE HONOURABLE DAINES BARRINGTON.

AS the effects of heat are seldom very remarkable in the northerly climate of England, where the summers are often so defective in warmth and sun-shine as not to ripen the fruits of the earth so well as might be wished, I shall be more concise in my account of the intensity of a summer season, and so make a little amends for the prolix account of the degrees of cold, and the inconveniences that we suffered from some late rigorous winters.

The summers of 1781 and 1783 were unusually hot and dry; to them therefore I shall turn back in my journals, without recurring to any more distant period. In the former of these years, my peach and nectarine-trees suffered so much from the heat, that the rind on the bodies was scalded and came off; since which the trees have been in a decaying state.*

* A frequent cause of decay in peaches and nectarines is their being excited by a few warm days in spring, when the sap vessels become filled with watery sap. In this state a severe frost sets in and then a thaw occurs: the sap vessels are burst by the frozen fluid, the economy of the tree deranged, and the sap ceases to flow in the injured branches.

This may prove a hint to assiduous gardeners to fence and shelter their wall-trees with mats or boards, as they may easily do, because such annoyance is seldom of long continuance. During that summer also, I observed that my apples were coddled, as it were, on the trees; so that they had no quickness of flavour, and they did not keep in the winter. This circumstance put me in mind of what I have heard travellers assert, that they never ate a good apple, or apricot, in the south of Europe, where the heats are so great as to render the juices vapid and insipid.

The great pests of a garden are wasps, which destroy all the finer fruits, just as they are coming into perfection. In 1781 we had none; in 1783 there were myriads; which would have devoured all the produce of my garden, had not we set the boys to take the nests; we caught thousands with hazel twigs tipped with bird-lime: and have since employed the boys to take and destroy the large breeding wasps in the spring. Such expedients have a great effect on these marauders, and will keep them under. Though wasps do not abound but in hot summers, yet they do not prevail then, as I have instanced in the two years above-mentioned.

In the sultry season of 1783, honey-dews were so frequent as to deface and destroy the beauties of my garden. My honey-suckles, which were one week, the most sweet and lovely objects that the eye could behold, became the next, the most loathsome; being

The first fine sunny day causes excessive perspiration in place of a regulated circulation, and the branch languishes and ultimately dies; to prevent all this, retard the trees in early spring, and protect them from spring frosts when started into growth.—Ed.

enveloped in a viscous substance, and loaded with black *aphides*, or smother-flies. The occasion of this clammy appearance seems to be this, that in hot weather, the effluvia of flowers, in fields, and meadows, and gardens, are drawn up in the day by a brisk evaporation, and then in the night fall down again with the dews, in which they are entangled; that the air is strongly scented, and therefore impregnated with the particles of flowers in summer weather, our senses will inform us; and that this sweet clammy substance is of the vegetable kind we may learn from bees, to whom it is very grateful: we may also be assured that it falls in the night, because it is always first seen in warm still mornings.*

On chalky and sandy soils, and in the hot villages about London, the thermometer has been often observed to mount as high as 83 or 84; but with us, in this hilly and woody district, I have hardly ever seen it exceed 80; nor does it often arrive at that pitch. The reason, I conclude, is, that our dense clayey soil, so much shaded by trees, is not so easily heated through, as those above-mentioned: and, besides, our mountains cause currents of air and breezes; and the vast evaporation from our woodlands tempers and moderates our heats.

* "It will hardly be deemed a discredit to an observer so patient and so accurate as Mr. White," says Mr. Mitford, "to point out how erroneous this explanation of honey-dew is. Mr. Curtis has shown that the substance in question is the excrement of the *aphides*. 'In order to convince a sceptical friend of this fact,' says Mr. Rennie, 'I placed a sheet of paper under a branch where some *aphides* were feeding, and over the leaves below them, which I had previously cleaned. The result was that the paper was soon covered with honey-dew, while the leaves below remained free.'"—Ed.

LETTER CIX.

TO THE HONOURABLE DAINES BARRINGTON.

THE summer of the year 1783, was an amazing, and portentous one, and full of horrible phænomena; for, besides the alarming meteors, and tremendous thunder-storms that affrighted and distressed the different counties of this kingdom, the peculiar haze, or smoky fog, that prevailed for many weeks in this island, and in every part of Europe, and even beyond its limits, was a most extraordinary appearance, unlike anything known within the memory of man. By my journal I find that I had noticed this strange occurrence from June 23 to July 20 inclusive, during which period the wind varied to every quarter, without making any alteration in the air. The sun, at noon, looked as blank as a clouded moon, and shed a rust-coloured, ferruginous light on the ground, and floors of rooms; but was particularly lurid, and blood-coloured at rising and setting. All this time the heat was so intense, that butchers' meat could hardly be eaten on the day after it was killed; and the flies swarmed so in the lanes, and hedges, that they rendered the horses half frantic, and made riding irk-

some. The country people began to look, with a superstitious awe, at the red, louring aspect of the sun; and indeed there was reason for the most enlightened person to be apprehensive; for, all the while, Calabria and part of the isle of Sicily, were torn and convulsed with earthquakes; and about that juncture a volcano sprung out of the sea on the coast of Norway. On this occasion Milton's noble simile of the sun, in his first book of Paradise Lost, frequently occurred to my mind; and it is indeed particularly applicable, because, towards the end, it alludes to a superstitious kind of dread, with which the minds of men are apt to be impressed by such strange and unusual phænomena.

"— — — As when the sun, new risen,
Looks through the horizontal, misty air,
Shorn of his beams; or from behind the moon,
In dim eclipse, disastrous twilight sheds
On half the nations, and with fear of change
Perplexes monarchs — — — — — —"

LETTER CX.

TO THE HONOURABLE DAINES BARRINGTON.

WE are very seldom annoyed with thunder-storms; and it is no less remarkable than true, that those which arise in the south have hardly been known to reach this village; for, before they get over us, they take a direction to the east, or to the west, or sometimes divide into two, and go in part to one of those quarters, and in part to the other; as was truly the case in summer 1783, when, though the country round was continually harassed with tempests, and often from the south; yet we escaped them all, as appears by my journal of that summer. The only way that I can at all account for this fact—for such it is—is that, on that quarter, between us and the sea, there are continuous mountains, hill behind hill, such as Nore-hill, the Barnet, Buster-hill, and Ports-down, which somehow divert the storms, and give them a different direction. High promontories, and elevated grounds, have always been observed to attract clouds, and disarm them of their mischievous contents, which are discharged into the trees, and summits, as soon as they come in contact with those turbulent meteors; while the humble vales escape, because they are so far beneath them.

But, when I say I do not remember a thunder-storm from the south, I do not mean that we never have suffered from thunder-storms at all; for on June 5th, 1784, the thermometer in the morning being at 64°, and at noon, at 70°, the barometer at 29°—six tenths one-half, and the wind north, I observed a blue mist, smelling strongly of sulphur, hanging along our sloping woods, and seeming to indicate that thunder was at hand. I was called in about two in the afternoon, and so missed seeing the gathering of the clouds in the north; which they who were abroad assured me, had something uncommon in their appearance. At about a quarter after two, the storm began in the parish of Hartley, moving slowly from north to south; and from thence it came over Norton-farm, and so to Grange-farm, both in this parish. It began with vast drops of rain, which were soon succeeded by round hail, and then by convex pieces of ice, which measured three inches in girth. Had it been as extensive as it was violent, or of any continuance (for it was very short), it must have ravaged all the neighbourhood. In the parish of Hartley, it did some damage to one farm; but Norton, which lay in the centre of the storm, was greatly injured; as was Grange, which lay next to it. It did but just reach to the middle of this village, where the hail broke my north windows, and all my garden-lights and hand-glasses, and many of my neighbours' windows. The extent of the storm was about two miles in length and one in breadth. We were just sitting down to dinner; but were soon diverted from our repast by the clattering of tiles and the jingling of glass. There fell at the same time prodigious torrents of rain on the farms above-mentioned, which occasioned a flood as

violent as it was sudden; doing great damage to the meadows and fallows, deluging the one, and washing away the soil of the other. The hollow lane towards Alton was so torn and disordered as not to be passable till mended, rocks being removed that weighed 200 weight. Those that saw the effect which the great hail had on ponds, and pools, say, that the dashing of the water made an extraordinary appearance, the froth and spray standing up in the air three feet above the surface. The rushing and roaring of the hail, as it approached the earth, was truly tremendous.

Though the clouds at South Lambeth, near London, were at that juncture thin and light, and no storm was in sight, nor within hearing, yet the air was strongly electric; for the bells of an electric machine at that place rang repeatedly, and fierce sparks were discharged.

When I first took the present work in hand I proposed to have added an *Annus Historico-naturalis*, or the Natural History of the Twelve Months of the Year; which would have comprised many incidents and occurrences that have not fallen in my way to be mentioned in my series of letters;—but, as Mr. Aikin of Warrington has published somewhat of this sort, and as the length of my correspondence has sufficiently put your patience to the test, I shall here take a respectful leave of you and natural history together; And am,

With all due deference and regard,
Your most obliged,
And most humble Servant,
GIL. WHITE.

SELBORNE, *June* 25, 1787.

MODERN NOMENCLATURE.

AUK, Little. *Arctica alle.*
Bat, Great. *Noctulinia altivolans.*
Bat, Long-eared. *Plecotus auritus.*
Bee. *Apis mellifica.*
Bee (making nest in chalky soil). *Bombus lapidarius.*
Bee (that strips down from plants). *Anthidium manicatum.*
Bee-bird. *Merops apiaster.*
Blackbird. *Turdus merula.*
Blackcap. *Sylvia atricapilla.*
Black Dolphin. *Haltica nemorum.*
Blackgame. *Tetrao tetrix.*
Blindworm. *Anguis fragilis.*
Boar, Wild. *Sus scrofa.*
Bohemian Waxwing. *Ampelis garrulus.*
Botflies. *Œstrus.*
Bug, Harvest. *Leptus autumnalis.*
Bullfinch. *Pyrrhula rubicilla.*
Bullhead. *Cottus gobio.*
Bunting. *Emberiza miliaria.*
Bunting, Reed. *Emberiza schæniclus.*
Bustard. *Otus tarda.*
Butcher-bird, Great. *Lanius excubitor.*
Butcher-bird, Red-backed. *Lanius collurio.*
Buzzard-honey. *Pernis apivorus.*
Canary-bird. *Carduelis canaria.*
Carp. *Cyprinus carpio.*
Cat. *Felis domestica.*
Chaffer, Fern. *Amphimalla solstitialis.*
Chaffer, Kentish. *Melolontha fullo.*
Chaffinch. *Fringilla cælebs.*
Cheese-jumper. *Piophila casei.*
Chiffchaff. *Sylvia rufa.*
Chough. *Coracina gracula.*
Coot. *Fulica atra.*
Cricket, Field. *Acheta campestris.*
Cricket, House. *Acheta domestica.*
Cricket, Mole. *Gryllotalpa vulgaris.*
Crossbill. *Loxia curvirostra.*
Crow. *Corvus corone.*
Crow, Grey, or hooded. *Corvus cornix.*
Cuckoo. *Cuculus canorus.*
Curlew. *Numenius arquata.*

Curlew, Stone. *Œdicnemus crepitans.*
Dabchick. *Podiceps minor.*
Daw. *Corvus monedula.*
Deer, Fallow. *Dama vulgaris.*
Deer, Moose. *Alces malchis.*
Deer, Red. *Cervus elaphus.*
Dipper. *Hydrobata cinclus.*
Diver, Great Northern. *Colymbus glacialis.*
Dove, Ring. *Columba palumbus.*
Dove, Rockie. *Columba livia.*
Dove, Stock. *Columba ænas.*
Dragon-flies. *Libellulidæ.*
Duck, Wild. *Anas boschas.*
Eagle. *Aquila chrysaetos.*
Earwig. *Forficula forcipata.*
Eel. *Anguilla.*
Eft. *Triton.*
Fieldfare. *Turdus pilaris.*
Fish, Gold. *Cyprinus auratus.*
Flamingo. *Phœnicopterus ruber.*
Fly, Forest. *Hippobosca equina.*
Fly, Ichneumon. *Ichneumonidæ.*
Fly, Nose. *Gasterophilus nasalis.*
Flycatcher. *Muscicapa grisola.*
Frog. *Rana temporaria.*
Glowworm. *Lampyris noctiluca.*
Goatsucker. *Caprimulgus Europæus.*
Goldfinch. *Fringilla carduelis.*
Greenfinch. *Fringilla chloris.*
Grosbeak. *Coccothraustes vulgaris.*
Grouse, Black. *See Blackgame.*
Guinea-fowl. *Numida meleagris.*
Hare. *Lepus timidus.*
Harvest-bug. *Leptus autumnalis.*
Harvest-mouse. *Mus minimus.*
Hawk-sparrow. *Accipiter nisus.*
Heathcock. *See Blackgame.*
Hedgehog. *Erinaceus Europæus.*
Hen-harrier. *Circus cyaneus.*
Heron. *Ardea cinerea.*
Hoopoe. *Upupa epops.*
Horse. *Equus caballus.*
Humming-bird Moth. *Macroglossa stellatarum.*
Ichneuma Fly. *See Flies Ichneumon.*
Kestrel. *Tinnunculus vulgaris.*
Kingfisher. *Alcedo ispida.*
Kite. *Milvus regalis.*
Lampern. *Lampetra fluviatilis.*
Landrail. *Ortygometra crex.*
Lapwing. *Vanellus cristatus.*
Lark, Sky. *Alauda arvensis.*
Lark, Willow. *Sylvia trochilus.*
Linnet. *Fringilla cannabina.*
Lizard. *Zootoca vivipara.*
Loach. *Cobitis barbatula.*
Maggot, Star-tailed. *Eristalis tenax.*
Magpie. *Pica caudata.*
Martin. *Chelidon urbica.*
Martin, Sand. *Cotile riparia.*
Mayfly. *Ephemera.*
Miller's-thumb. *See Bullhead.*
Missel-thrush. *Turdus viscivorus.*

Mole. *Talpa Europæa.*
Mole, Cricket. *See Cricket.*
Moor-hen. *Gallinula chloropus.*
Moose. *Alces malchis.*
Mouse, Harvest. *See Harvest Mouse.*
Mouse, Shrew. *Sorex araneus.*
Newt. *See Eft.*
Nightingale. *Luscinia philomela.*
Nuthatch. *Sitta Europæa.*
Oriole, Golden. *Oriolus galbula.*
Osprey. *Pandion haliætus.*
Otter. *Lutra vulgaris.*
Ousel, Ring. *Turdus torquatus.*
Ousel, Water. *See Dipper.*
Owl, Barn. *Strix flammea.*
Owl, Brown. *Surnium aluco.*
Owl, Eagle. *Bubo maximus.*
Owl, Fern. *See Goatsucker.*
Owl, White. *Nyctea nivea.*
Partridge. *Perdrix cinerea.*
Peacock. *Pavo cristatus.*
Peewit. *See Lapwing.*
Peregrine Falcon. *Falco peregrinus.*
Pettichaps. *Sylvia hortensis.*
Pheasant. *Phasianus Colchicus.*
Pigeon, Wood. *See Ringdove.*
Poultry. *Gallus domesticus.*
Puffin. *Fratercula arctica.*
Quail. *Coturnix communis.*
Rabbit. *Lepus cuniculus.*
Rat, Water. *Arvicola amphibius.*
Raven. *Corvus corax.*
Redbreast. *Erythacus rubecula.*
Redwing. *Turdus iliacus.*
Redstart. *Ruticilla phœnicura.*
Sandpiper. *Tringoides hypoleuca.*
Sedgewarbler. *Sylvia salicaria.*
Shrew. *See Mouse-shrew.*
Shrew, Water. *Crossopus fodiens.*
Shrikes. *See Butcher-birds.*
Skunk. *Mephilis varians.*
Slugs. *Limacidæ.*
Snail. *Helix aspersa.*
Snipe. *Numenius.*
Snowflake. *Plectrophanes nivalis.*
Sparrow, Hawk. *See Hawk-sparrow.*
Sparrow, Hedge. *Accentor modularius.*
Sparrow, House. *Passer domesticus.*
Squirrel. *Sciurus Europæus.*
Swallow. *Hirundo rustica.*
Swan. *Cygnus olor.*
Swift. *Cypselus apus.*
Teal. *Querquedula crecca.*
Tench. *Tinca vulgaris.*
Thrush. *Turdus musicus.*
Thrush, Missel. *See Missel-thrush.*
Titlark. *Anthus pratensis.*
Titmouse, Blue. *Parus cæruleus.*
Titmouse, Great. *Parus major.*
Titmouse, Long-tailed. *Parus caudatus.*
Toad. *Bufo vulgaris.*
Tortoise. *Testudo Græca.*
Turkey. *Meleagris gallopavo.*
Turnip-fly. *See Black Dolphin.*
Viper. *Pelias berus.*
Wagtail, Pied. *Motacilla yarrellii.*
Wagtail, Yellow. *Motacilla flava.*

Rook. *Corvus frugilegus.*
Warbler, Grasshopper. *Calamodyta locustella.*
Warbler, Sedge. *See Sedge Warbler.*
Wasp. *Vespa vulgaris.*
Waxwing. *See Bohemian Waxwing.*
Weasel. *Mustela vulgaris.*
Wheatear. *Sylvia œnanthe.*
Whinchat. *Saxicola rubetra.*
Whitethroat. *Sylvia cinerea.*
Wigeon. *Marca penelope.*
Windhover. *See Kestrel.*
Woodcock. *Scolopax rusticola.*
Woodpecker. *Picus major.*
Worm, Earth. *Lumbricus terrestris.*
Worm, Blind. *See Blind-worm.*
Worm, Glow. *See Glow-worm.*
Wren. *Troglodytes vulgaris.*
Wren, Golden-crested. *Regulus cristatus.*
Wren, Willow. *Sylvia trochilus.*
Wryneck. *Junx torquilla.*
Yellowhammer. *Emberiza citrinella.*

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